THE COLUMBIAN CYCLOPEDIA

THIRTY-TWO VOLUMES
VOL. 25
PROPODIUM—RETFORD

WITH ILLUSTRATIONS

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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thĕr.*
ā	care, fair	*cār, fār.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
é	her, stir, heard, cur	*hér, stér, hérd, kér.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ō	Goethe (similar to *e* in her)	*gō teh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chār, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bóċh, hī′dĕl-bĕrċh, lóċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th	though, breathe	*thō, brēth.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ĕr, vĭzh′ŭn.*

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ABBREVIATIONS USED IN THIS WORK.

a., *or* adj....adjective
A.B .....Bachelor of Arts
abbr.....abbreviation, abbreviated
abl. *or* abla..ablative
Abp.....Archbishop
abt.....about
Acad.....Academy
acc. *or* ac..accusative
accom.....accommodated, accommodation
act.....active
A.D.....in the year of our Lord [*Anno Domini*]
Adjt .....Adjutant
Adm .....Admiral
adv. *or* ad..adverb
A. F.....Anglo-French
Ag.....Silver [*Argentum*]
agri.....agriculture
A. L.....Anglo-Latin
Al.....Aluminium
Ala.....Alabama
Alb.....Albanian
alg.....algebra
A.M.....before noon [*ante meridiem*]
A.M. .....Master of Arts
Am.....Amos
Amer.....America, -n
anat.....anatomy, anatomical
anc.....ancient, anciently
AN. M.. ....in the year of the world [*Anno Mundi*
anon.....anonymous
antiq.....antiquity, antiquities
aor.....aorist, -ic
app.....appendix
appar.....apparently
Apr.....April
Ar.....Arabic
arch.....architecture
archæol....archæology
arith.....arithmetic
Ariz.....Arizona
Ark.....Arkansas
art.....article
artil.....artillery
AS.....Anglo-Saxon
As.....Arsenic
Assoc.....Association
asst.....assistant
astrol.....astrology
astron... ..astronomy
attrib.....attributive
atty.....attorney
at. wt.....atomic weight
Au.....Gold [*Aurum*]
A.U.C.....in the year of the building of the city (Rome) [*Annourbis conditæ*]
Aug.....August
aug.....augmentative
Aust.....Austrian
A. V.....authorized version [of Bible, 1611]
avoir.....avoirdupois
B .....Boron
B.....Britannic
b.....born
Ba .....Barium
Bart.....Baronet
Bav.....Bavarian
bl.; bbl....barrel; barrels
B.C.....before Christ
B.C.L.....Bachelor of Civil Law
B.D.....Bachelor of Divinity
bef.....before
Belg.....Belgic
Beng.....Bengali
Bi.....Bismuth
biog.....biography, biographical
biol.....biology
B.L.....Bachelor of Laws
Bohem.....Bohemian
bot.....botany, botanical
Bp.....Bishop
Br.....Bromine
Braz.....Brazilian
Bret.....Breton
Brig.....Brigadier
Brit.....British, Britannica
bro.....brother
Bulg.....Bulgarian
bush.....bushel, bushels
C.....Carbon
c.....century
Ca.....Calcium
Cal.....California
Camb.....Cambridge
Can.....Canada
Cant.....Canterbury
cap.....capital
Capt.....Captain
Card.....Cardinal
carp.....carpentry
Cath.....Catholic
caus.....causative
cav.....cavalry
Cd.....Cadmium
Ce.....Cerium
Celt.....Celtic
cent.....central
cf.....compare [*confer*]
ch *or* chh...church

Chal.....Chaldee
chap.....chapter
chem.....chemistry, chemical
Chin.....Chinese
Chron.....Chronicles
chron.....chronology
Cl.....Chlorine
Class.....Classical [= Greek and Latin]
Co.....Cobalt
Co.....Company
co.....county
cog.....cognate [with]
Col.....Colonel
Col.....Colossians
Coll.....College
colloq.....colloquial
Colo.....Colorado
Com.....Commodore
com.....commerce, commercial
com.....common
comp.....compare
comp.....composition, compound
compar....comparative
conch.....conchology
cong.....congress
Congl.....Congregational
conj .....conjunction
Conn *or* Ct.Connecticut
contr.....contraction, contracted
Cop.....Coptic
Cor.....Corinthians
Corn.....Cornish
corr.....corresponding
Cr.....Chromium
crystal....crystallography
Cs.....Cæsium
ct.....cent
Ct.*or* Conn.Connecticut
Cu.....Copper [*Cuprum*]
cwt.....a hundred weight
Cyc.....Cyclopedia
D.....Didymium
D. *or* Dut..Dutch
d.....died
d. [l. s. d.]..penny, pence
Dan.....Daniel
Dan.....Danish
dat .....dative
dau.....daughter
D. C.....District of Columbia
D.C.L.....Doctor of Civil [or Common] Law
D.D.....Doctor of Divinity
Dec.....December
dec.....declension
def.....definite, definition
deg.....degree, degrees
Del.....Delaware
del.....delegate, delegates
dem.....democratic
dep.....deputy
dep.....deponent
dept.....department
deriv.....derivation, derivative
Deut.....Deuteronomy
dial.....dialect, dialectal
diam.....diameter
Dic.....Dictionary
diff.....different, difference
dim.....diminutive
dist.....district
distrib..distributive
div.....division
doz.....dozen
Dr.....Doctor
dr.....dram, drams
dram.....dramatic
Dut. *or* D...Dutch
dwt .....pennyweight
dynam *or* dyn.....dynamics
E.....Erbium
E. *or* e.....East, -ern, -ward
E. *or* Eng..English
Eccl.....Ecclesiastes
eccl. *or* eccles.....ecclesiastical [affairs]
ed .....edited, edition, editor
e.g.....for example [*exempli gratia*]
E. Ind. *or* E. I.....East Indies, East Indian
elect.....electricity
Emp.....Emperor
Encyc.....Encyclopedia
Eng. *or* E..English
engin.....engineering
entom.....entomology
env. ext....envoy extraordinary
ep.....epistle
Eph .....Ephesians
Episc .....Episcopal
eq. *or* =...equal, equals
equiv.....equivalent
esp.....especially
Est .....Esther
estab.....established
Esthon.....Esthonian
etc.....and others like [*et cetera*]
Eth.....Ethiopic
ethnog.....ethnography
ethnol.....ethnology
et seq.....and the following [*et sequentia*]
etym.....etymology
Eur.....European
Ex.....Exodus
exclam.....exclamation
Ezek.....Ezekiel
Ezr.....Ezra
F.....Fluorine
F. *or* Fahr..Fahrenheit
f. *or* fem...feminine
F. *or* Fr....French
fa.....father
Fahr. *or* F..Fahrenheit
far.....farriery
Fe.....Iron [*Ferrum*]
Feb.....February
fem *or* f. ..feminine
fig.....figure, figuratively
Fin.....Finnish
F.—L.....French from Latin
Fla.....Florida
Flem.....Flemish
for.....foreign
fort.....fortification
Fr. *or* F....French
fr.....from

freq.....frequentative
Fris .....Frisian
ft.....foot, feet
fut..... future
G. *or* Ger...German
G.....Glucinium
Ga.....Gallium
Ga.....Georgia
Gael.....Gaelic
Gal .....Galatians
gal.....gallon
galv.....galvanism, galvanic
gard.....gardening
gen.....gender
Gen .....General
Gen .....Genesis
gen..... genitive
Geno.....Genoese
geog .. ...geography
geol.....geology
geom.....geometry
Ger ....,...German, Germany
Goth.....Gothic
Gov.....Governor
govt.....government
Gr.....Grand, Great
Gr.....Greek
gr.....grain, grains
gram .....grammar
Gr. Brit....Great Britain
Gris .....Grisons
gun ..... gunnery
H .....Hegira
H.....Hydrogen
h.... .....hour, hours
Hab .....Habakkuk
Hag .....Haggai
H. B. M.....His [or Her] Britannic Majesty
Heb .....Hebrew, Hebrews
her .....heraldry
herpet.....herpetology
Hg.....Mercury [*Hydrargyrum*]
hhd.....hogshead, hogsheads
Hind.....Hindustani, Hindu, or Hindi
hist .....history, historical
Hon .....Honorable
hort.....horticulture
Hos .....Hosea
Hung.....Hungarian
Hydros.....Hydrostatics
I .....Iodine
I.; Is.....Island ; Islands
Icel.....Icelandic
ichth.....ichthyology
Ida .....Idaho
i.e.....that is [*id est*]
Ill.....Illinois
illus .....illustration
impera *or* impr.....imperative
impers.....impersonal
impf *or* imp.imperfect
impf. p. *or* imp .....imperfect participle
improp.....improperly
In.....Indium
in... .....inch, inches
incept.....inceptive
Ind .....India, Indian
Ind .....Indiana
ind.....indicative
indef .....indefinite
In-Eur....Indo European
inf.....infantry
inf *or* infin.infinitive
instr.....instrument, -al
int... .....interest
intens.....intensive
interj. *or* int.....interjection
interrog....interrogative pronoun
intr. *or* intrans...intransitive
Io... .....Iowa
Ir..... ..Iridium
Ir..... ...Irish
Iran..... ..Iranian
irr .....irregular, -ly
Is.....Isaiah
It .....Italian
Jan.....January
Jap.....Japanese
Jas.....James
Jer. .....Jeremiah
Jn.....John
Josh.....Joshua
Jr ... .Junior
Judg .....Judges
K.....Potassium [*Kalium*]
K.....Kings [in Bible]
K.....king
Kan.....Kansas
Kt.....Knight
Ky.....Kentucky
L.....Latin
L.....Lithium
l. [l. s. d.], £..... } pound, pounds [sterling]
La.....Lanthanium
La.....Louisiana
Lam.....Lamentations
Lang.....Languedoc
lang.....language
Lap.....Lapland
lat .....latitude
lb.; llb. *or* lbs..... } pound ; pounds [weight]
Let.....Lettish
Lev . ..... Leviticus
LG.....Low German
L.H.D.....Doctor of Polite Literature
Lieut.....Lieutenant
Lim .....Limousin
Lin .....Linnæus, Linnæan
lit .....literal,-ly
lit .....literature
Lith.....Lithuanian
lithog.....lithograph, -y
LL.....Late Latin, Low Latin
LL.D.....Doctor of Laws
long.....longitude
Luth.....Lutheran
M.....Middle
M.....Monsieur
m.....mile, miles
m. *or* masc..masculine
M.A.....Master of Arts
Macc. . ....Maccabees
mach... ....machinery
Mag.....Magazine

Maj.....Major
Mal.....Malachi
Mal.....Malay, Malayan
manuf.....manufacturing, manufacturers
Mar.....March
masc *or* m.masculine
Mass.....Massachusetts
math .....mathematics, mathematical
Matt.....Matthew
M.D..... ...Doctor of Medicine
MD.....Middle Dutch
Md .....Maryland
ME.....Middle English, or Old English
Me.....Maine
mech.....mechanics, mechanical
med.....medicine, medical
mem .....member
mensur...mensuration
Messrs. *or* MM .....Gentlemen, Sirs
metal .....metallurgy
metaph....metaphysics, metaphysical
meteor.....meteorology
Meth .....Methodist
Mex.....Mexican
Mg.....Magnesium
M.Gr.....Middle Greek
MHG.....Middle High German
Mic..... ..Micah
Mich .....Michigan
mid.....middle [voice]
Milan.....Milanese
mid. L. *or* ML..... } Middle Latin, Mediæval Latin
milit. *or* mil.... ..military [affairs]
min .....minute, minutes
mineral....mineralogy
Minn.....Minnesota
Min. Plen..Minister Plenipotentiary
Miss .....Mississippi
ML. *or* mid. L... } Middle Latin, Mediæval Latin
MLG.....Middle Low German.
Mlle.....Mademoiselle
Mme.....Madam
Mn.....Manganese
Mo.....Missouri
Mo.....Molybdenum
mod.....modern
Mont.....Montana
Mr.....Master [Mister]
Mrs.....Mistress [Missis]
MS.; MSS..manuscript; manuscripts
Mt.....Mount, mountain
mus.....music
mus.doc....Doctor of Music
myth.....mythology, mythological
N.....Nitrogen
N. *or* n.....North, -ern, -ward
n .....noun
n *or* neut...neuter
Na.....Sodium [*Natrium*]
Nah.....Nahum
N. A., *or* N. Amer.North America, -n
nat.....natural
naut.....nautical
nav.....navigation, naval affairs
Nb.....Niobium
N. C. *or* N. Car...North Carolina
N. D.....North Dakota
Neb.....Nebraska
neg.....negative
Neh.....Nehemiah
N. Eng.....New England
neut *or* n...neuter
Nev .....Nevada
N.Gr.....New Greek, Modern Greek
N. H .....New Hampshire
NHG.....New High German [German]
Ni ... .Nickel
N. J.....New Jersey
NL .....New Latin, Modern Latin
N. Mex. ...New Mexico
N. T., *or* N. Test...New Testament
N. Y.....New York [State]
nom.....nominative
Norm. F...Norman French
North. E ..Northern English
Norw... ...Norwegian, Norse
Nov.....November
Num.....Numbers
numis.....numismatics
O.....Ohio
O.....Old
O.....Oxygen
Obad.....Obadiah
obj.....objective
obs. *or* †...obsolete
obsoles ....obsolescent
O.Bulg.....Old Bulgarian or Old Slavic
Oct.....October
Odontog...odontography
OE.....Old English
OF *or* O. Fr....Old French
OHG.....Old High German
Ont.....Ontario
opt .. ..optics, optical
Or.....Oregon
ord .....order
ord.... ...ordnance
org.....organic
orig.....original, -ly
ornith.....ornithology
Os .....Osmium
OS. .....Old Saxon
O. T., *or* O. Test...Old Testament
Oxf.....Oxford
oz.....ounce, ounces
P.....Phosphorus
p.; pp.....page; pages
p., *or* part..participle
Pa. *or* Penn.Pennsylvania
paint .....painting
palæon.....palæontology
parl.....parliament
pass.....passive

pathol *or* path.....pathology
Pb.....Lead [*Plumbum*]
Pd.....Palladium
Penn *or* Pa.Pennsylvania
perf.....perfect
perh.....perhaps
Pers.....Persian, Persic
pers.....person
persp.....perspective
pert.....pertaining [to]
Pet.....Peter
Pg. *or* Port.Portuguese
phar.....pharmacy
PH.D.....Doctor of Philosophy
Phen.....Phenician
Phil.....Philippians
Philem.....Philemon
philol.....philology, philological
philos. *or* phil.....philosophy, philosophical
phonog.....phonography
photog.....photography
phren.....phrenology
phys.....physics, physical
physiol.....physiology, physiological
Pied.....Piedmontese
Pl.....Plate
pl. *or* plu...plural
Pl. D.....Platt Deutsch
plupf.....pluperfect
P.M.....afternoon[*post meridiem*]
pneum.....pneumatics
P. O.....Post-office
poet.....poetical
Pol.....Polish
pol econ...political economy
polit.....politics, political
pop.....population
Port. *or* Pg.Portuguese
poss.....possessive
pp.....pages
pp.....past participle, perfect participle
p. pr.....present participle
Pr. *or* Prov.Provençal
pref.....prefix
prep.....preposition
Pres.....President
pres.....present
Presb.....Presbyterian
pret.....preterit
prim.....primitive
priv.....privative
prob.....probably, probable
Prof.....Professor
pron.....pronoun
pron.....pronunciation, pronounced
prop.....properly
pros.....prosody
Prot.....Protestant
Prov.*or* Pr.Provençal
Prov.....Proverbs
prov.....province, provincial
Prov. Eng..Provincial English
Prus.....Prussia, -n
Ps.....Psalm, Psalms
psychol....psychology

pt.....past tense
pt.....pint
Pt.....Platinum
pub.....published, publisher, publication
pwt.....pennyweight
Q.....Quebec
qt.....quart
qtr.....quarter [weight]
qu.....query
q.v.....which see [*quod vide*]
R.....Rhodium
R.....River
Rb.....Rubidium
R. Cath....Roman Catholic
rec. sec.....recording secretary
Ref.....Reformed
refl.....reflex
reg.....regular, -ly
regt.....regiment
rel. pro. *or* rel.....relative pronoun
repr.....representing
repub.....republican
Rev.....Revelation
Rev.....The Reverend
Rev. V.....Revised Version
rhet.....rhetoric, -al
R. I.....Rhode Island
R. N.....Royal Navy
Rom.....Roman, Romans
Rom.....Romanic or Romance
Rom. Cath. Ch. *or* R. C. Ch.....Roman Catholic Church
r.r.....railroad
Rt. Rev....Right Reverend
Ru.....Ruthenium
Russ.....Russian
r.w.....railway
S.....Saxon
S.....Sulphur
s.....second, seconds
s. [l. s. d.]..shilling, shillings
S. *or* s.....South, -ern, -ward
S. A. *or* S. Amer..South America, -n
Sam.....Samaritan
Sam.....Samuel
Sans, *or* Skr.....Sanskrit
Sb.....Antimony [*Stibium*]
s.c.....understand, supply, namely [*scilicet*]
S. C. *or* S. Car....South Carolina
Scand.....Scandinavian
Scot.....Scotland, Scotch
scr.....scruple, scruples
Scrip.....Scripture [s], Scriptural
sculp.....sculpture
S. D.....South Dakota
Se.....Selenium
sec.....secretary
sec.....section
Sem.....Semitic
Sep.....September
Serv.....Servian
Shaks.....Shakespeare
Si.....Silicon

Sic.....Sicilian
sing.....singular
sis.....sister
Skr. *or* Sans.....Sanskirt
Slav.....Slavonic, Slavic
Sn.....Tin [*Stannum*]
Soc.....Society
Song Sol...Song of Solomon
Sp.....Spanish
sp. gr.....specific gravity
sq.....square
Sr.....Senior
Sr.....Strontium
St.: Ste....Saint
St.....street
stat.....statute
S.T.D.....Doctor of Sacred Theology
subj.....subjunctive
suf.....suffix
Su. Goth...Suo-Gothic
superl.....superlative
Supp.....Supplement
Supt.....Superintendent
surg.....surgery, surgical
Surv.....surveying
Sw.....Swedish
Swab.....Swabian
sym.....symbol
syn.....synonym, -y
Syr.....Syriac, Syrian
t.....town
Ta.....Tantalum
Tart.....Tartar
Te.....Tellurium
technol.....technology
teleg.....telegraphy
Tenn.....Tennessee
term.....termination
terr.....territory
Teut.....Teutonic
Tex.....Texas
Th.....Thorium
theat.....theatrical
theol.....theology, theological
therap.....therapeutics
Thess.....Thessalonians
Ti.....Titanium
Tim.....Timothy
Tit.....Titus
Tl.....Thallium
toxicol.....toxicology
tp.....township
tr. *or* trans.transitive
transl.....translation, translated
trigon.....trigonometry
Turk.....Turkish
typog.....typography, typographical
U.....Uranium
ult.....ultimate, -ly
Unit.....Unitarian
Univ.....Universalist
Univ.....University
U. Presb...United Presbyterian
U. S.....United States
U. S. A.....United States Army
U. S. N.....United States Navy
Ut.....Utah
V.....Vanadium
v.....verb
Va.....Virginia
var.....variant [word]
var.....variety of [species]
Ven.....Venerable
Venet.....Venetian
vet.....veterinary
v. i. *or* v. intr....verb intransitive
vil.....village
viz.....namely, to-wit [*videlicet*]
v. n.....verb neuter
voc.....vocative
vol.....volume
vols.....volunteers
Vt.....Vermont
v. tr.....verb transitive
W.....Tungsten [*Wolfram*]
W.....Welsh
W. *or* w....West, -ern, -ward
Wal.....Walachian
Wall.....Walloon
Wash.....Washington
Westph....Westphalia, -n
W. Ind. *or* W. I...West Indies, West Indian
Wis.....Wisconsin
wt.....weight
W. Va.....West Virginia
Wyo.....Wyoming
Y.....Yttrium
yd.....yard
yr.....year
Zech.....Zechariah
Zeph.....Zephaniah
Zn.....Zinc
zool.....zoology, zoological
Zr.....Zirconium

See also ABBREVIATIONS in Vol. I.

PROPODIUM, n. *prō-pō′dĭ-ŭm* [Gr. *pro*, before; *pous* or *podos*, a foot]: the anterior part of the foot in mollusks.

PROPOLIS, n. *pro-p ō′lis* [L. and Gr. *propōlis*, bee-glue —from Gr. *pro*, before; *polis*, a city—named from its abundance at the most exposed parts of the hive]: substance used by bees in construction of their combs, to give the fabric a strength which it could not have if made of wax alone: see BEE. It is used also for closing up chinks of the hive. It is a resinous unctuous substance of a reddish-brown color, a somewhat bitter taste, and an agreeable aromatic odor, and is collected from the buds of trees. Huber found bees eagerly to appropriate the viscous exudation which abounds on poplar buds. P. probably differs a little in chemical composition according to the tree from which it is obtained, but it consists chiefly of resin. It is brought to the hive on the legs of bees, and adheres to them so strongly that the assistance of other bees is necessary for its removal. Foreign bodies introduced into a bee-hive, and which the bees are unable to remove, are covered with it.

PROPONENT, n. *prō-pō′nĕnt* [L. *proponens* or *proponent-tem*, proposing—from *pro*, forth; *ponens*, placing]: one who makes a proposal or lays down a proposition.

PROPON′TIS: see SEA OF MARMORA.

PROPORTION, n. *prō-pōr′shŭn* [F. *proportion*—from L. *proportiōnem*, comparative relation, proportion—from *pro*, before; *portio*, a part or share; *pars*, a part. It *proporzione*]: relation or correspondence of parts between unequal things of the same kind; symmetry; in *arith.*, a rule in which three terms are given to find a fourth (see below); in *geom.*, the identity, equality, or similitude of ratios (see below); mutual fitness or correspondence of parts to each other, and to the whole, equal degree; equal or just share; form; size: V. to adjust the comparative relation of one thing, or one part, to another; to form symmetrically; to divide into equal or just shares. PROPOR′TIONING, imp. PROPOR′TIONED, pp. *-shŭnd*. PROPOR′TIONABLE, a. *-shŭn-ă-bl*, that may be proportioned. PROPOR′TIONABLY, ad. *-ă-blĭ*. PROPOR′TIONABLENESS, n.

-bl-nĕs, the state of being porportionable. PROPOR'TIONAL, a. *-shŭn-ăl*, being in proportion; having a due comparative relation; having the same ratio: N. a number or quantity in proportion. PROPOR'TIONALS, n. plu. *-ălz*, the terms of a proportion. PROPOR'TIONALLY, ad. *-ăl-lĭ*, in a stated degree PROPOR'TIONAL'ITY, n. *-ăl'-ĭ-tĭ*, the quality of being in proportion. PROPOR'TIONATE, a. *-āt*, adjusted to something else according to a certain rate or comparative relation: V. to adjust according to a settled rate. PROPOR'TIONATING, imp. PROPOR'TIONATED, pp. PROPOR'TIONATELY, ad. *-lĭ*, in a proportionate manner. PROPOR'TIONATENESS, n. *-nĕs*, the state of being adjusted by due or settled proportion; suitableness of proportions. PROPOR'TIONLESS, a. *-lĕs*, without symmetry of parts. CONTINUED PROPORTION, a succession of several equal ratios. HARMONICAL or MUSICAL PROPORTION, a relation of three or four quantities, such, that the first is to the last, as the difference between the two first is to the difference between the two last. IN PROPORTION, according as; to the degree that. RECIPROCAL or INVERSE PROPORTION, a proportion in which the first term is to the second as the fourth is to the third. CONTINUED PROPORTIONALS, quantities of which the ratios of the first to the second, of the second to the third, of the third to the fourth, and so on, are all equal. MEAN PROPORTIONAL, the middle term of three in continued proportion; or the square root of the first and third of three terms in continued proportion, as 4 is the mean proportional between 2 and 8.

PROPOR'TION, in Arithmetic and Geometry: particular species of relation subsisting between groups of numbers or quantities. Notwithstanding that the idea of proportion is found to exist in perfection in the mind of every one, yet a good definition of it is very difficult. The two definitions which, on the whole, are least objectionable are that of Euclid, and the ordinary arithmetical definition. The latter states proportion to be the 'equality of ratios,' and throws us back on the definition of the term *Ratio* (q.v.); which may most simply be considered as the relation of two numbers to each other, shown by a division of the one by the other. Thus, the ratio of 12 to 3, expressed by $\frac{12}{3}$ or 4, denotes that 12 contains 3 four times; and the ratio also of 8 to 2 being 4, we have from our definition a statement that the four numbers, 12, 3, 8, and 2, are in proportion, or, as it is commonly expressed, 12 bears to 3 the same ratio that 8 does to 2, or 12 : 3 :: 8 : 2. In the same way, it is shown that 3 : 8 :: $13\frac{1}{2}$: 36; for $\frac{3}{8}$ expresses the ratio of the first to the second, and $\frac{13\frac{1}{2}}{36} = \frac{27}{72} = \frac{3}{8}$. It will be gathered from the two arithmetical proportions here given, and from any others that can be formed, that '*the product of*

the first and last terms (the *extremes*) *is equal to the product of the second and third terms* (the *means*);' and upon this property of proportional numbers directly depends the arithmetical rule called 'proportion,' etc. The object of this rule is to find a fourth proportional to three given numbers—i.e., a number to which the third bears the same ratio that the first does to the second, and the number is at once found by multiplying together the second and third terms, and dividing the product by the first. Proportion is illustrated arithmetically by such problems as, 'If four yards cost six dollars, what will ten cost?' Here, 15 being the fourth proportional to 4, 6, and 10, fifteen dollars is the answer. The distinction of proportion into *direct* and *inverse* is not only quite unnecessary, but mischievous, as it tends to create the idea, that it is possible for more than *one* kind of proportion to subsist. *Continued proportion* indicates a property of every three consecutive or equidistant terms in a 'Geometrical Progression' (q.v.)—e.g., in the series 2, 4, 8, 16, 32 . . . . 2 : 4 : : 4 : 8, 4 : 8 : : 8 : 16, etc., or 2 : 8 : : 8 : 32, etc. In the above remarks, all consideration of *Incommensurable Magnitudes* (q.v.) has been omitted.—The definition given by Euclid is as follows: Four magnitudes are proportional, when, any equimultiples whatever being taken of the first and third, and any whatever of the second and fourth, according as the multiple of the first is greater, equal to, or less than that of the second, the multiple of the third is also greater, equal to, or less than that of the fourth—i.e., A, B, C, D are proportionals, when if mA is greater than nB, mC is greater than nD; if mA is equal to nB, mC is equal to nD; if mA is less than nB, mC is less than nD; m and n being any multiples whatsoever. The apparent cumbrousness and circumlocution in this definition arise from Euclid's endeavor to include incommensurable quantities; throwing them out of account, it is sufficient to say that four magnitudes are proportional, if, like multiples being taken of the first and third, and like of the second and fourth, when the multiple of the first is equal to the multiple of the second, the multiple of the third is equal to the multiple of the fourth. Abundance of illustrations of the general definition are in the Fifth Book of Euclid, and of the particular one in the notes appended to some of the later editions of the same work. An arithmetical instance of the working of the particular definition is here given. Taking the four numbers of a previous example—12, 3, 8, 2; of 12 and 8 take multiples by 4, and of 3 and 2 by 16, then 12×4 (the multiple of the first) $= 3 \times 16$ (the multiple of the second), and 8×4 (the multiple of the third) $= 2 \times 16$ (the multiple of the fourth). In this example, the two multiples were so taken that the multiple of the first would be equal to the multiple of the second, and when it was found that the multiple of the third was also equal to the multiple of the fourth, the proportionality of the four numbers was established.

PROPRIETOR, n. *prō-prī′ĕ-tĕr* [It. *proprietario*: F. *propriétaire*—from mid. L. *propriĕtārĭŭs*, a proprietor—from L. *propriŭs*, one's own]: an owner of property, fixed or movable; one having a legal right to anything, whether in possession or not. PROPRI′ETRESS, n. *-trĕs*, a woman who has the legal right to anything. PROPRI′ETOR-SHIP, n. the state of being proprietor. PROPRI′ETARY. a. *-tĕr-ĭ*, belonging to a proprietor or proprietors: N., an owner or owners.

PROPRĪETY, n. *prō-prī′ĕ-tĭ* [F. *propriété*, property, virtue; L. *proprietas*, ownership—from *proprĭŭs*, one's own]: *formerly*, ownership or possession; *now*, state of being right or proper; appropriateness; fitness; conformity to established rules or customs; decorum.

PROPROCTOR, n. *prō-prŏk′tĕr* [*pro*, for; and *proctor*]: in *Eng. universities*, an assistant proctor.

PROPTOSIS, n. *prŏp-tō′sĭs* [Gr. *proptōsis*, a falling down or forward—from *pro*, before; *ptōsis*, a fall; *piptein*, to fall]: a protrusion of the eyeball.

PROPUGN, v. *prō-pūn′* [L. *propugno*, I go forth to fight—from *pro*, forward; *pugno*, I fight]: in *OE.*, to vindicate; to defend; to contend for. PROPUGN′ING, imp. PROPUGNED′, pp. *-pūnd′*. PROPUGNATION, *prō′pŭg-nā′shŭn*, defense.

PROPULSION, n. *prō-pŭl′shŭn* [L. *propulsus*, hurled or cast forward—from *pro*, forward; *pulsus*, driven (see PROPEL)]: the act of propelling or driving forward. PROPUL′SIVE, a. *-sĭv*, or PROPUL′SORY, a. *-sĕr-ĭ*, having power to propel or drive forward.

PROPYL, n. *prō′pĭl* [Eng. *propionic*, and the suffix *-yl* = Gr. *hūlē*, matter, the common termination of the radicals]: C_3H_7: called also Trityl: third of a series of alcohol or ether radicals. Normal P. alcohol, $C_3H_7 \cdot HO$, is an oily liquid. PROPYLAMINE, n. *prō-pĭl′ă-mēn*, C_3H_9N, is a strongly alkaline liquid boiling at 58° Fahr.

PROPYLON, n. *prŏp′ĭ-lŏn* [Gr. *propʻulon*—from *pro*, before; *pulē*, a gate]: in *arch.*, the porch or vestibule of a temple or great hall. PROP′YLÆ′UM, n. *-lē′ŭm* [L.—from Gr. *propʻulaion*, generally in plural, *propʻulaia*, a gateway, especially of the Acropolis at Athens, built by Pericles]: in same sense as P.; a porch or entrance to a sacred inclosure, consisting of a gateway flanked by buildings.

PRO RATA, phrase, *prō rā′tà* [L.]: in proportion; proportionally. Used in law and commerce; as, shareholders participate in profits *pro rata* to their interest or holding.

PRORECTOR, n. *prō-rĕk′tĕr:* officer in a German univ., who presides in the senate or academic court.

PRO RE NATA, phrase, *prō rē nā′tà* [L.]: according to circumstances or exigencies. A *pro re nata* meeting is one called on an emergency.

PRORE, n. *prōr* [Gr. and L. *prōra*, the prow]: in *OE.*, the forepart of a ship; the prow.

PROROGUE, v. *prō-rōg'* [F. *proroger*, to prorogue—from L. *prorogārĕ*, to prolong, to continue—from *pro*, forward; *rogārĕ*, to ask: It. *prorogare*]: to put off; to defer; to continue parliament from the end of one session till the commencement of another, at a time mentioned, done by royal authority. PRORO'GUING, imp. *-gĭng*. PROROGUED', pp. *-rōgd'*. PROROGATION, n. *prō'rō-gā'shŭn* [F.—L.]: specifically of Brit. parliament—discontinuance of the meetings of parliament, with continuance of parliament itself from one session to another. It differs from *adjournment*, which is a continuance of one session from day to day, or from a particular period to a later. Parliament is prorogued by the queen's command, signified in her presence by the lord chancellor, or speaker of the house of lords, to both houses; or in her absence by writ under the Great Seal, or by commission. Prorogation not only suspends all business, but quashes all proceedings pending at the time, except impeachments by the commons, and writs of error and appeals before the house of lords. A bill must be renewed after a prorogation, as if it had never been introduced. A prorogation for a single day has sometimes been resorted to, to enable a bill to be brought in a second time, it being a rule that no second bill of the same substance with a prior one can be introduced in the same session. After parliament has been prorogued to a particular day, the queen may, by proclamation, call it together on any other day, not less than 14 days distant. See PARLIAMENT.—SYN. of 'prorogue': to adjourn: postpone; defer; protract; prolong; delay.

PROSAIC, PROSAICAL: see under PROSE.

PROSCENIUM, n. *prō-sē'nĭ ŭm* [L. *proscēnĭum*: Gr. *prokēnion*, the stage—from Gr. *pro*, before; *skēnē*, a tent, a stage]: the whole of the stage in an anc. theatre; in a modern one, the part from the curtain or drop-scene to the orchestra; also applied to the curtain and the ornamental framework from which it hangs.

PROSCOLEX, n. *prŏs'kō-lĕks* [Gr. *pro*, before; *skōlēx*, a worm]: the first embryonic stage of a tape-worm.

PROSCRIBE, v. *prō-skrīb'* [L. *proscrībĕrĕ*, to proscribe, to outlaw—from *pro*, before; *scrībo*, I write: Sp. *proscribir*, to outlaw]: to doom to destruction by writing down in a list; to put out of the protection of law; to denounce and condemn; to banish; to outlaw; to prohibit or interdict. PROSCRIB'ING, imp. PROSCRIBED', pp. *-skrībd'*. THE PROSCRIBED, persons proscribed. PROSCRIB'ER, n. *-ĕr*, one who proscribes. PROSCRIPT, n. *prō'skrĭpt*, one proscribed. PROSCRIPTION, n. *prō-skrĭp'shŭn* [F.—L.]: the act of proscribing or outlawing; in *anc. Rome*, the offer of a reward for the head of a political enemy; condemnation; rejection. PROSCRIP'TIVE, a. *-tĭv*, pert. to proscription. PROSCRIP'TIVELY, ad. *-lĭ*.

PROSE, n. *prōz* [F. *prose*—from L. *prosa*, prose—from *prorsus*, right forward, right onward—from *pro*, forward; *versus*, turned; *verto*, I turn: It. *prosa*, prose]: the ordinary written or spoken language of man; the opposite of *verse* or *poetry;* in *OE.*, a rhythm in the Rom. liturgy; in *Eng. school slang*, an attendance at school on a Sunday when part of a sermon was read: V. to write prose; to write in a dull, tedious style; to talk in such a dull, uninteresting way as to bore the listener: ADJ. relating to prose; not poetical; dull; unromantic. PROS'ING, imp.: ADJ. talking or writing in an uninteresting manner. N. dull and tedious minuteness in speech or writing: PROSED, pp. *prōzd.* PROSAIC, a. *prō-zā'ĭk*, or PROSA'ICAL, a. *-i-kăl* [It. *prosaico;* F. *prosaïque*, prosaic—from L. *prosaĭcus*]: pert. to or resembling prose: dull; tedious; uninteresting; unimaginative. PROSA'ICALLY, ad. *-kăl-lĭ.* PROSA'IST, n. *-ĭst*, a writer of prose. PROSY, a. *prōz'ĭ*, dull or tedious in discourse or writing. PROSINESS, n. *-nĕs*, tedious dulness in talking or writing. PROS'INGLY, ad. *-lĭ.*

PROSECTOR, n. *prō-sĕk'tĕr* [L. *pro*, before; *sector*, a cutter; *seco*, I cut]: one who prepares subjects for anatomical lectures; an anatomist.

PROSECUTE, v. *prŏs'ē-kūt* [L. *prosĕcutus*, followed after—from *pro*, forward; *sĕquor*, I follow]: to follow or pursue after for a purpose; to persist in or continue, as efforts already begun; to seek to obtain by legal process; to sue criminally; to carry on a legal prosecution. PROS'ECUTING, imp. PROS'ECUTED, pp. PROS'ECUTOR, n. *-kū-tĕr*, one who carries on a criminal suit against another. PROS'ECUTRIX, n. *-trĭks*, a woman who undertakes a prosecution in a law court. PROS'ECU'TION, n. *-kū'shŭn*, a pursuit; a criminal suit (see below); pursuit by efforts of body or mind.

PROSECU'TION, in Law: term generally applicable to all kinds of litigation, but used technically to denote the institution of criminal proceedings against a party. There are two ways in which a prosecution begins: one is to summon, or, in the graver cases, to arrest and bring the offender before a justice of the peace, when the witnesses are examined, and if the justice thinks a *primâ facie* case is made out, he commits the offender for trial. Another way is without any such preliminary inquiry before a justice, for the prosecutor to go with witnesses before a grand jury, and in all cases this is a step in the prosecution. The grand jury hear the witnesses, and if they think there is a *primâ facie* case, they find a true bill; if otherwise, they ignore the bill. The bill means an indictment. When the indictment is found, the prisoners are arraigned at the bar, and asked by the judge whether they plead guilty or not guilty; and in general they plead not guilty. A jury are then sworn, and try the case, and find a verdict of guilty or not guilty: if the verdict be 'guilty,' the judge sentences the prisoner to punishment according to the offense.

In general, a new trial cannot be held in criminal cases, though, if an error is committed, the conviction may be quashed.

PROS'ECUTOR, Public (or Prosecu'ting Attorney): in the United States, an officer elected or appointed to prosecute offenders. Under the federal govt., an officer known as the atty.gen. of the United States is appointed by the pres. to prosecute all suits in which the United States may be concerned, in the U. S. supreme court; and another officer, known as the dist.atty. of the United States, is similarly appointed in each judicial district to prosecute persons charged with crimes and offenses cognizable under U. S. authority, and to prosecute civil actions in which the United States may be concerned, in the U. S. dist. court. Under state govts. the gov. usually appoints an officer, known as the atty. gen. of the state, who takes charge of prosecutions in which the state may be concerned; and also an officer, known variously as county prosecutor, public prosecutor, prosecutor of the pleas, etc., in each co., to prosecute criminal and civil actions in the courts of his county. All these appointments are subject to confirmation by the U. S. senate or the state senates. Under municipal govts., mayors appoint, or boards of aldermen elect, an officer known as city atty., to prosecute specific offenses against the city. Such federal, state, and municipal officers are either allowed by law regular deputies or assistants, or, in exceptional cases, have lawyers assigned to aid them.

PROSELYTE, n. *prós'é-līt* [F. *prosélyte*—from mid. L. *prosēlytus*, a proselyte—from Gr. *prosḗlutos*, a foreigner, a convert to the Jewish religion—from *pros*, to, and *el'thein*, to come: It. *proselito*]: one received or brought over to some particular opinion or belief; a convert to some religion; in *Scrip.*, a Gentile conformist to the Jewish law and belief (see below): V. to convert to some religion; to gain over to an opinion. Pros'elyting, imp. Pros'elyted, pp. Pros'elytize, v. *-el-i-tīz*, to make a convert to a religion or a religious sect. Pros'elytizing, imp.: Adj. making proselytes. Pros'elytized, pp. *-tīzd*. Pros'elytism, n. *-tizm*, the making of converts to a religion, sect, or party; conversion to a system or creed; the desire to make converts.—Proselytes of the Jews, heathens who became converts to Judaism. Two kinds of P. were distinguished: (1) 'P. of the Gate,' heathen strangers, who, in order to be allowed to reside in Palestine, had undertaken to submit to the 'Seven Commandments of the Sons of Noah,' that prohibit blasphemy, idolatry, murder, incest, theft, disobedience to the authorities, and eating flesh with the blood in it: commandments which probably had grown out of certain restrictions originally put on the 'strangers' by the Mosaic Law (Ex. xii. 19; xx. 10, etc.). These 'P. of the Gate,' or 'Sojourners,' could not claim all the privileges of an Israelite, could not redeem their

first-born, and, at a later period, were not allowed to live in Jerusalem; yet they were permitted to offer whole burnt-offerings, and otherwise contribute toward maintaining the public worship of the nation. (2) 'P. of the Covenant,' comprising the *Gere hatsedek* (Pious P.) or *Gere haberith* (P. of the Covenant). These accepted all the dogmas and customs of Judaism to their full extent, and were called 'Complete Israelites.' The new candidates were first strictly asked for their motives, and the classification of those who were not to be admitted runs as follows: those whose motive is love (husband for the sake of following his wife's faith, or *vice versâ*); P. of the Tables of the Kings (i.e., those who covet court-favor); Esther P. (who wish to escape some threatening danger, cf. Esther, viii. 7); and Lion-P. (those who, from superstitious fear, wish to enter Judaism, like the Samaritans, II Kings, xvii. 26). If, on the other hand, the motives were satisfactory, the candidate was further cautioned against attaching himself to a persecuted people, and warned that sufferings of all kinds would be his lot in this life. If all this did not deter him, he was 'brought under the wings of God.' He was fully instructed in the religion and history of the people, and shown the special Providence that guided them and watched over them. If a male, he was circumcised, and, in case of his being circumcised already (e.g., if he belonged to another nation practicing this rite), a few drops of blood were drawn 'from the blood of the covenant,' a special prayer was said for him, and a new name was given him, while for that of his father, Abraham was substituted. After the healing of the wound, Baptism (Tebilah) followed, and he had further to offer a Sacrifice (Korban). Females had to undergo baptism and to bring a sacrifice. All natural relations were then cancelled, the Proselyte was considered like 'a new-born child,' and the Holy Spirit was supposed to come upon him.

The desire to proselytize, which became strong among the political leaders during the Maccabean period, and which led to the 'bringing into the Congregation' entire nations, such as the Idumæans under John Hyrkan, the Ituræans under Aristobulos, contrasted strongly and most characteristically with the utter contempt in which the newcomers were held by the people, and with the suspicion with which they were regarded, and their (after all) limited social rights and ambiguous position. The Talmud speaks of them in no measured terms, and there is no doubt that, on the whole, they must have held a very dubious position. They were called the Leprosy of Israel; it was the P. and other reprobates who stood in the way of the coming of the Messiah; and to the 24th generation were they to be distrusted. Yet, notwithstanding all this, conversions were very frequent, especially among the better classes—and among women principally—in Damascus, Greece, Asia Minor, Rome; so much so, that even the Roman legis-

lation was compelled, B.C. 1st c., to provide for cases of Judaizers. It is a fact worth remembering that one of the main features of the times of the Messiah was to be, according to Jewish tradition, the utter abolition of proselytism, and the entire ceasing of all distinctions of an opprobrious nature among men. The evil repute into which the term Proselyte had fallen in the times of Christ caused the early converts to Christianity to adopt the name *Neophytes* (newly planted) instead.—SYN. of 'proselyte, n.': convert; neophyte; pervert.

PROSENCEPHALON, n. *prŏs'ĕn-sĕf'ă-lŏn* [Gr. *pros*, before; *engkephălon*, the brain—from *en*, in; *kephalē*, the head]: the cerebral hemispheres, or lobes of the fore-brain.

PROSENCHYMA, n. *prŏs-ĕng'kĭ-mă* [Gr. *pros*, before, in addition; *engchĕō*, I pour in; *chuma*, juice, tissue; *chĕō*, I pour]: in *bot.*, fusiform cells, or tissue forming wood; tissue formed of elongated pointed cells. PROSENCHYMATOUS, a. *prŏs'ĕng-kĭm'ă-tŭs*, of or pert. to prosenchyma.

PROSERPINA, *prō-sĕr'pi-nă*, Latin form of the Greek PERSEPHONE (also PERSEPHATTA, PERSEPHASSA, PHERÆPHASSA; in Homer, PERSEPHONEIA): Greek goddess, according to the common myth, daughter of Zeus and Demēter (Ceres) or of Styx. The story of her abduction by 'gloomy Dis' (Pluto, god of the dead), while gathering flowers on the plains of Enna, in Sicily, in company with Artemis and Athena, does not occur in Homer, who simply represents her as wife of the king of Hades, and the majestic queen of the Under-world—a subterranean Hera (Juno). It is given first by Hesiod, and is manifestly an allegory of the seasons: see CERES. In the mystical Orphic Hymns, P. appears as the all-pervading goddess of nature, who produces and destroys everything, and she has been confused and identified with other mystical goddesses, Rhea, Artemis, Hekate, etc., sometimes even with Isis of the Egyptians, and she corresponds as goddess of the dead, to the old Norse goddess Hel (Goth. *Haljo*). She was generally worshipped under the name *Kore*, 'maiden,' with her mother Demēter. The chief seats of her worship were Sicily and Magna Græcia: but she had temples also at Corinth, Megara, Thebes, and Sparta. In works of art, P. is represented sometimes as the grave and earnest spouse of Pluto, sitting on a throne beside her sombre husband, with a sceptre and a little box; but more frequently as a blooming virgin, the picture of her mother, in the act of being carried off to Hades.

PROSING, PROSINESS, etc.: see under PROSE.

PRO-SLAVERY, n. *prō-slā'vĕr-ĭ* [*pro*, for, and *slavery*]: advocacy of slavery.

PROSOBRANCHIATA, n. plu. *prŏs'ō-brăng-kĭ-ā'tă* [Gr. *prŏsō*, in front, in advance of; *brang'chiă*, gills of a fish]: a division of gasteropodous mollusks, in which the gills are situated in advance of the heart.

PROSODY, n. *prŏs'ō-dĭ* [F. *prosodie*—from L. and Gr. *prosōdiă*, the quantity of syllables and measure of verse, tone or accent of a syllable—from Gr. *pros*, to or in addition to; *ōdē*, a song or tune—from *aeidein*, to sing]: that part of gram. which treats of quantity, accent, and the laws of versification, i.e., of the rules of rhythm in metrical composition (see METER: RHYME: BLANK VERSE). PROSODIAL, a. *prō-sō'dĭ-ăl*, or PROSOD'ICAL, a. *-sŏd'ĭ-kăl*, pert. to prosody, or according to its rules. PROSO'DIAN, n. *-sō'dĭ-ăn*, or PROSODIST, n. *prŏs'ō-dĭst*, one who is skilled in prosody. PROSODICALLY, ad. *prō-sŏd'ĭ-kăl-lĭ*.

PROSOMA, n. *prō-sō'mă* [Gr. *pro*, before; *sōma*, a body]: in *zool.*, the anterior part of the body.

PROSONOMASIA, n. *prŏs-ŏn-o-mā'zĭ-a* [Gr. *pros*, to, toward; *onomazō*, I call, I name; *onoma*, a name]: in *rhet.*, a figure in which allusion is made to the likeness of sound in several names or words; a sort of pun.

PROSOPOPŒIA, n. *prŏs'ō-pō-pē'yă* [Gr. *prŏsōpōn*, a person—from *pros*, toward; *ōps* or *ōpa*, a face; *poiĕō*, I make]: in *rhet.*, a figure of speech by which things are spoken of or represented as persons; personification.

PROSPECT, n. *prŏs'pĕkt* [L. *prospectus*, a look-out, a distant view—from *pro*, forward; *specio*, I look]: a looking forward; a distant view—in common law not protected from obstruction by other buildings, except that the light is not to be sensibly obstructed (see LIGHT); that which is present to the eye, as a scene or landscape; a place which affords a view; a view delineated; position of a building; regard to something future; expectation. PROSPECTING, n. *prŏs-pĕkt'ĭng*, a miner's term for searching or examining for gold, as preliminary to settled or continuous operations. PROSPECT'IVE, a. *-ĭv*, looking forward in time; viewing at a distance; future; opposed to *retrospective*. PROSPECT'IVELY, ad. *-lĭ*. PROSPECT'IVENESS, n. *-nĕs*, state of being prospective. PROSPEC'TION, n. *-shŭn*, the act of looking forward or providing for future wants. PROSPEC'TUS, n. *-tŭs*, a plan or outline of something proposed, submitted for public approval, as of a new company or joint-stock association; the plan of a literary work.

PROSPER, v. *prŏs'pĕr* [F. *prospère*, prosperous—from L. *prospĕrus*, fortunate; *prospĕrārĕ*, to prosper, to be propitious—from *pro*, according to; *spes*, hope: It. *prospero*, prosperous]: to render fortunate or happy; to thrive; to be successful; to flourish. PROS'PERING, imp. PROS'PERED, pp. *-pĕrd*. PROS'PEROUS, a. *-pĕr-ŭs*, flourishing; successful: thriving; making gain or increase. PROS'PEROUSLY, ad. *-lĭ*. PROS'PEROUSNESS, n. *-nĕs*, the state of being prosperous or successful. PROS-

PERITY, n. *prŏs-pĕr'i-tĭ.* [F. *prospérité*—from L. *prospĕr'itas*]: success; good fortune; thriving condition.—SYN. of 'prosperity': welfare; well-being; good fortune: success; prosperousness; happiness; weal;—of 'prosperous': fortunate; lucky; auspicious; successful; flourishing; favorable; gaining.

PROSSNITZ, *prŏs'nĭts*: manufacturing town of Austria, in Moravia, in the fruitful plain of Hanna; on the Rumza, 12 m. s.w. of Olmütz. It has manufactories of woolen cloth, cashmeres, linen and cotton stuffs, distilleries, and breweries. Pop. (1890) 21,192.

PROSTATE, a. *prŏs'tāt* [Gr. *pro*, before, *histemi*, to stand]: standing in front of: used only to designate a certain gland. PROSTATE GLAND, or simply PROSTATE, gland surrounding the neck of the bladder and the commencement of the urethra in the male human individual. It is of the form and size of a horse-chestnut, and has a very dense structure, consisting of glandular substance and muscular tissue. It secretes a white viscid humor, which is discharged into the urethra by 10–20 excretory ducts, and is probably allied to that discharged from the *vesiculæ seminales*, for which it serves as a vehicle. The prostate gland is liable to become enlarged in advanced age, or at any age to become inflamed in consequence of gonorrhea or the use of instruments. Enlargement of the prostate causes dysuria. Sometimes calculi are deposited in the prostate, usually in aged persons, though sometimes in young subjects: such prostatic calculi occasionally attain the size of a hen's egg. PROSTATIC, a. *prŏs'tăt'ik*, of or pert. to the prostate gland. PROSTATI'TIS, n. *-tī'tĭs*, the inflammation of the prostate gland.

PROSTHESIS, n. *prŏs'thē-sĭs* [Gr. *prosthĕsis*, a placing to, an increase—from *pros*, to or toward; *thĕsis*, a putting or placing; *tithēmi*, I place]: in *gram.*, a figure by which one or more letters are placed at the beginning of a word; opposite of *aphæresis*; in *surg.*, an overlapping; the artificial supplying of any defect or part lost—applied to the fresh growths which fill up ulcers or fistulæ. PROSTHET'IC, a. *-thĕt'ĭk*, prefixed.

PROSTITUTE, v. *prŏs'tĭ-tūt* [L. *prostitūtus*, placed or set forth openly—from *pro*, before; *statŭo*, I place: It *prostituire*: F. *prostituer*]: to give up or expose for hire that which ought not to be sold; to offer for indiscriminate lewdness; to devote to an infamous or improper purpose: ADJ. sold or devoted to infamous purposes: N. woman openly given to indiscriminate lewdness for hire; a strumpet; a base mercenary or hireling. PROS'TITUTING, imp. PROS'TITUTED, pp. PROS'TITUTOR, n. *-tū-tĕr*, one who prostitutes anything. PROSTITUTION, n. *prŏs'tĭ-tū'shŭn* [F.—L.]: common lewdness for hire; act or practice of offering for sale that which ought not to be sold, as ability, influence, etc. LAW AS TO PROSTITUTION, forms of legal restriction, etc., of this vice. In the sense of the law, a prostitute is a woman who

practices common lewdness for gain. In general the law does not take cognizance of the practice of prostitution: only when it becomes a public scandal, as when lewd women ply their trade in the streets, accosting passengers, or otherwise trying to lure men to their resorts; or when the places where such women are harbored are 'disorderly' or disturb the public peace, do they become liable to punishment under the law; and then not formally on account of lewdness but as disturbers of the peace and order of society. But the keeper of a house of prostitution is indictable at common law for keeping a common nuisance. The law, however, shows its abhorrence of the offense in various ways. Thus, a landlord cannot recover in court rent for the use of a house that he has let for the purpose of prostitution; neither will a contract be enforced whose consideration on one side is prostitution; neither party to the act of prostitution, as such, has any legal remedy against the other. But police regulation largely supplements the law.—In certain localities in the British isles—naval and military stations—public women are subjected to strict surveillance, obliged to submit to medical examination, and punished if they ply their trade without a certificate. In France and some other countries of continental Europe the police have long had such supervision of the 'social evil.' In the United States police control has hitherto extended only to the restricting of prostitution. Medical supervision is nowhere enforced by ordinance, though, 1891, a project was under consideration in the legislature of Mo., to empower the police authorities of St. Louis to institute a modified system of medical examination and certification of prostitutes. The existing ordinances of the city of St. Louis fairly exhibit the spirit and scope of such ordinances throughout the United States: they provide fines for those who keep, frequent, or inhabit houses of ill fame, or who let houses for the purpose of prostitution; for street-walking, etc., by bawds; solicitation in public places, etc. See CONTAGIOUS DISEASES, etc.

PROSTRATE, v. *prŏs'trāt* [L. *prostrātus*, spread out, prostrated—from *pro*, before; *sternĕrĕ*, to stretch out: It. *prosternere*: F. (*se*) *prosterner*]: to lay flat or at length; to throw down; to demolish; to fall down in adoration; to bow in humble reverence; to reduce totally or exhaust, as the strength: ADJ. lying at length; extended on the ground; lying at mercy, as a suppliant; thrown down in the humblest adoration. PROS'TRATING, imp. PROS'TRATED, pp. PROSTRATION, n. *prŏs-trā'shŭn* [F.—L.], the act of throwing down or laying flat; act of humility or adoration; great depression or dejection; exhaustion; great diminution of the vital energies.

PROSTYLE, n. *prō'stīl* [Gr. *pro*, before; *stūlos*, a column]: in *arch.*, a portico for columns in front of an edifice: a temple with a portico at both ends was termed amphi-prostyle.

PROSY: see under PROSE.

PROSYLLOGISM, n. *prō-sil'ō-jizm* [L. *pro*, for, and Eng. *syllogism*]: a form of argument, in which two or more syllogisms are so connected, that the conclusion of the one becomes the *major* or *minor* of the next.

PROT-, *prōt*, or PROTO-, *prō'tō* [Gr. *prōtos*, first]: prefix used to express priority, as protomartyr, etc.; in *chem.*, a prefix in many scientific compounds, denoting the first or smallest degree of a substance which combines with a base, as *protoxide*, the first or smallest proportion of oxygen: the first or earliest, as *protogine*; the earliest or lowest, as *protozoa*. PROTOXIDE OF IRON denotes one equivalent of oxygen and one of iron.

PROTAGON, n. *prō'tă-gŏn* [Gr. *prōtagos*, leading the van—from *prōtos*, first; *agō*, I lead]: a phosphoretted fatty substance found in the nerve-centres and peripheral nerves; the first proximate element discovered in the brain.

PROTAGONIST, n. *prō-tăg'ō-nist* [Gr. *prōtos*, first; *agōnis'tēs*, an actor]: a chief actor; one who takes the leading part.

PROTAGORAS, *prō-tăg'ō-ras*: Greek sophist: prob. about B.C. 480—prob. B.C. 411; b. Abdera, of humble parentage. He was the first who took the name 'Sophist,' or who taught for pay. When he went to Athens, is not precisely known; but he is conjectured to have gone thither about the middle of the century, and he seems to have enjoyed the friendship of Perikles. Accused of atheism by one of his own scholars, he was banished from Athens, and his writings were ordered to be publicly burned. The basis of his speculation is the proposition, that 'man is the measure of all things,' which was developed by him in a way that involved the most thorough-going skepticism. The *Theætetus* and *Protagoras* of Plato are devoted to a refutation of P.'s doctrines, which, as delineated by the great philosopher, appear shallow, confused, and untenable. All P.'s works are lost, though some were extant as late as the time of Porphyry.

PROTANDROUS, a. *prō-tăn'drŭs*, or PROTERANDROUS, a. *prō'tĕr-ăn'drŭs* [Gr. *prōtos*, first; *protĕros*, earlier; *anēr* or *andra*, a male]: in *bot.*, having stamens reaching maturity before the pistil. PROTANDRY, n. *prō-tăn'drĭ*, the state or condition of a plant in which the stamens are perfected before the pistil.

PRO TANTO, phrase, *prō tăn'tō* [L.]: for so much.

PROTASIS, n. *prŏt'ă-sĭs* [Gr. *protăsis*, an antecedent, the beginning of a drama—from *pro*, before; *'teinō*, I stretch out]: in *gram.* and *rhet.*, the first or subordinate member of a sentence, generally conditional—the second being called the *apodosis*; in the *anc. drama*, the first part, containing an exposition of the subject.

PROTEACEÆ, *prō-tē-ā'sē-ē*: natural order of exogenous plants, containing about 650 known species of shrubs and small trees, natives chiefly of s. Africa and of Australia, and forming a remarkable feature of the vegetation of these regions. Some of them, as species of *Protea* and *Banksia* (q.v.), are frequently cultivated in gardens and greenhouses, being prized for their singular and elegant appearance, and their curious and often beautiful flowers. They have usually umbellate branches; their leaves are evergreen, and remarkably hard, dry, and woody, divided or undivided, and without stipules. The perianth is four-leaved or four-cleft; the stamens four, one of them sometimes sterile, perigynous, opposite to the segments of the perianth; the ovary superior, consisting of a single carpel; with one, two, or many ovules; the style simple, the stigma undivided; the fruit dry or succulent, and opening or not opening, many fruits often collected in a kind of cone. The timber of some of the larger species is used for various purposes; others supply much of the firewood of the Cape of Good Hope and Australia. The nuts or seeds of some are eaten, as those of *Brabejum stellatum* in s. Africa, and of *Guevina Avellana* (called also *Quadria heterophylla*) in Chili. Those of the latter are much esteemed, and are called *Avellans* and *Nebu*.

PROTEAN, a. *prō'tē-ăn* or *prō-tē'ăn* [Gr. *Prōteŭs*, in *anc. myth.*, a sea deity having the faculty of assuming different shapes]: of or resembling Proteus (q.v.); readily assuming different shapes. PROTEUS, n. *prō'tē-ŭs*, genus of batrachian reptiles (see below): genus of infusoria whose forms are incessantly changing.

PROTECT, v. *prō-tĕkt'* [L. *protectus*, covered before or in front, protected—from *pro*, before; *tegĕrĕ*, to cover, to conceal: It. *proteggere*; F. *protégér*]: to cover from danger; to throw a shelter over; to shield; to guard; to patronize. PROTECT'ING, imp.: ADJ. shielding from injury; preserving in safety. PROTECT'ED, pp. PROTEC'TION, n. *-tĕk'shŭn* [F.:—L.]: the act of preserving from evil or injury; that which protects; shelter; refuge; a passport or other writing given by authority, which exempts or secures from molestation; advantage or favor given to any branch of industry by a government (see PROTECTIVE DUTY). PROTECT'INGLY, ad. *-li*. PROTEC'TIONIST, n. *-ist*, one opposed to free trade unless it be reciprocal; one who advocates the protection of home industries by the imposition of import duties on foreign produce or manufacture. PROTEC'TIONAL, a. *-ăl*, pert. to protection. PROTECT'IVE, a. *-tĕkt'ĭv*, serving or tending to defend or shelter. PROTECTIVE DUTY, in polit. economy, a customs duty imposed on foreign manufactures to a degree which by preventing their large importation into a country may foster that country's manufacturing industries and tend to general prosperity; see TARIFF: FREE TRADE. PROTECT'OR, n. one who protects; a guardian (see below). PROTECT'RESS, n. *-rĕs*, a woman who shields or preserves from danger. PROTECT'ORLESS, a. *-lĕs*, without a protector. PROTEC'TORSHIP, n. the office or government of a protector. PROTECT'ORATE, n. *-ĕr-ăt*, in *Eng. hist.*, applied to the govt. of Oliver Cromwell: the protection granted by a superior power to an inferior or dependent one. PROTECTORIAL, a. *prō'tĕk-tō'rĭ-ăl*, pert. to a protector.—SYN. of 'protect': to defend; guard; preserve; shield; save; secure; cover; shelter.

PROTECT'OR: title which has sometimes been conferred in England on the person who had care of the kingdom during the sovereign's minority. The Earl of Pembroke was P. 1216, in the minority of Henry III. Humphry, Duke of Gloucester, was P. in the minority of Henry VI., 1422-47. Richard, Duke of Gloucester, was P. 1483, prior to his ascending the throne as Richard III. The Duke of Somerset, one of King Henry VIII.'s 16 executors, was 1548 constituted P. during the minority of Edward VI., with the assistance of a council, consisting of the remaining 15 executors; a dignity, however, which he held but a few months. Oliver Cromwell, 1653, Dec., took the title Lord Protector of the Commonwealth of England, Scotland, and Ireland. In 1658, his son Richard succeeded to his title and authority, but was never formally installed in the Protectorate, which he resigned in the following year.

PROTÉGÉ, n., PROTÉGÉE, fem. *prō'tā-zhā'* [F. *protégé*, a dependent person; *protégée*, a female under the protection of another—from L. *protegĕrĕ*, to shield from danger]: one under the care and protection of another; one having the favor of another.

PROTEIDS, *prō'tē-ĭdz*, or ALBUMINOIDS, or PROTEIN BODIES [Gr. *Prōteus*, a self-transforming sea-god]: compounds forming the chief part of the solid constituents of the blood, muscles, nerves, glands, and other organs of animals; occurring also in small quantities in almost the whole structure of plants, but in larger quantity in the seeds. P. are formed exclusively in plants, and undergo but little transformation when assimilated by animals. The composition of the P. varies little between one class of them and another; as appears from the following table, which shows their minimum and maximum content of the 5 elements of which they consist:

Carbon	52.7—54.5	per cent.
Hydrogen	6.9— 7.3	"
Nitrogen	15.4—16.5	"
Oxygen	20.9—23.5	"
Sulphur	0.8— 1.6	"

The average contents of the several elements may be approximately represented by the formula $C_{72}H_{112}N_{18}O_{22}S$. Phosphorus is found associated with these elements in the P., but only in mechanical mixture as calcium phosphate.

The P. have been classed as follows:

Class I. ALBUMINS: these are soluble in water. Albumins are divided into 1. *Serum Albumin*, the most abundant albuminous substance in animal bodies. It can be obtained from blood serum by precipitation with lead acetate, washing with water, suspending the precipitated lead compound in water, and decomposing it with carbonic acid. Pure serum albumin is a yellow transparent body which when perfectly dry can be heated to 212° F. without change. When dissolved in water it can be precipitated with alcohol. Its specific rotation is—56° for yellow light. Mineral acids, when very dilute and added in small quantity do not precipitate it; in large quantities they precipitate it immediately, nitric acid acting most strongly. Ether does not coagulate it.

2. *Egg Albumin* gradually gives a precipitate when agitated with ether; it is precipitated also by oil of turpentine; strong nitric acid does not precipitate it. Its specific rotation is—35·5° for yellow light.—The *vitellin* contained in solution in the yolk of eggs is a mixture of albumin and casein.

3. *Plant Albumin* occurs in nearly all vegetable juices. It closely resembles egg albumin, and is coagulated by heat.

Class II. GLOBULINS: these compounds are insoluble in water, but are soluble in very dilute acids and alkalis, and in 1 per cent. solutions of sodium chloride and neutral salts.

1. *Myosin*. This is the chief constituent of the muscle plasma inclosed in the sarcolemma tubes of muscular fibre. In living muscle it is liquid, but when *rigor mortis* sets in, it coagulates. Myosin is insoluble in water, like the other globulins, but is soluble in very dilute

acids, alkalis, and sodium chloride. It is coagulated by alcohol and by heating with water.

2. *Globu'lin*, also called *Paraglobulin* and *Paraglobin*, is obtained from fresh blood serum diluted in ten times its volume of water, by passing through the solution a brisk stream of carbonic acid: the fine granular precipitate is separated by decantation and filtration, and the residuum washed with water. It is readily soluble in dilute saline solutions, but carbonic acid gas or a very dilute acid precipitates it again. It is insoluble in water. Globulin is present not only in blood serum, but also in the aqueous humor of the eye, in the juice of the cornea, in the connective tissue, etc.

3. *Fibrinoplas'tin.* When hydrocele fluid, pericardial fluid, or any other fluid capable of producing a clot with blood serum or paraglobulin, is treated by the method adopted for globulin, a substance is obtained that resembles globulin in all respects except that the carbonic acid precipitate is less easily produced and more flaky, and that the substance is more readily precipitated from the liquids in which it is formed, by a mixture of alcohol and ether; also by the fact that it produces fibrin when mixed with fibrinoplastic globulin.

Class III. Derived Albumins: these are insoluble in water and in sodium chloride solution, but soluble in dilute acids and alkalis.

1. *Acid-Albumin.* If a small quantity of hydrochloric or of acetic acid be added to serum or egg albumin, no precipitation takes place, and in gradually raising the temperature of the mixture to 158° F., coagulation at that or at a higher temperature is entirely prevented. At the same time the influence of the fluid on polarized light is altered, so that the rotation to the left becomes 72° instead of 35°. On carefully neutralizing the cooled mixture, the whole of the proteid matter becomes a white, flocculent precipitate. By the action of the acid, the albumin soluble in water has been made insoluble. The precipitate is very readily soluble in excess of the alkali used for neutralization, may be reprecipitated by again neutralizing with an acid, again redissolved by excess, and so on.

2. *Alkali-Albumin*, or *Albuminate*, or *Casein.* When albumins are treated with dilute caustic alkali instead of acid, coagulation by heat is similarly prevented, and the whole of the proteid may in like manner be thrown down on neutralization. Some of the bodies thus produced cannot be distinguished from milk casein, though casein probably is not identical with artificial albuminate. Dried casein and albuminate are yellow, transparent, and hygroscopic, not soluble in water. The most striking property of casein is its coagulability by certain animal membranes, as is seen in the process of cheese-making.—*Plant-casein* or *legumin* exists chiefly in the seeds of leguminous plants.

Class IV. Fibrin. This compound is insoluble in water, and but sparingly soluble in dilute acids and alkalis, and in neutral saline solutions: see Fibrin.

Class V. Coagulated Proteids. Coagulated albumin is formed from albumin, fibrin, myosin, etc., by heating their neutral solutions to boiling, or by action of alcohol. By hydrochloric acid, or by ether, egg albumin is changed into coagulated albumin. However produced, the coagulated proteids are mostly insoluble in dilute hydrochloric acid; but when pepsin also is present at blood heat, they change first into syntonin, then into peptone. By strong hydrochloric acid they are dissolved, and by caustic potash they are changed into albuminates.

Class VI. Peptones. All albuminous substances are changed into *peptones* by action of the acid gastric juice. Peptones are found only in the stomach and in the contents of the small intestines. They are highly diffusible, easily soluble in water, insoluble in alcohol or ether. They are not precipitable either by acids or by alkalis: see Digestion.

PROTEIN, n. *prō'tĕ-ĭn* [Gr. *prōteu'ō*, I hold the first place or rank—from *prōtos*, first]: in *chem.*, a hypothetical substance supposed by some to form the basis of albumin, caseine, and fibrin (see Proteids): in *bot.*, formerly applied to aleurone. Proteinous, a. *prō-tē'ĭ-nŭs*, of or pert. to or containing protein.

PROTELES, *prō'tē-lēz* [Gr. *pro*, before; *teleios*, complete, referring to normal number of toe-toes]: genus of Hyena family, differing from hyenas proper in having the mammalian number of anterior digits, five, instead of four. The Aard-wolf, or Gray Jackal (*P. cristatus*), of S. Africa, is the only species of the only genus of the sub-family *Proteleæ*. The first name means earth-wolf, from its burrowing habit. It is the size of a fox, brown, with dark transverse stripes, and an erectile mane on neck and back. Timid and nocturnal, it feeds on termites, carrion, etc. It is regarded as combining certain characteristics of hyenas, civets, and dogs.

PRO TEMPORE, *prō tem'pō-rē* [Lat.]: for the time, for the moment: abbreviated to *pro tem.*

PROTENCHYMA, n. *prō-teng'ki-mā* [Gr. *prōtos*, first; *engcheō*, I pour in; *chauma*, juice, tissue—from *chuō*, I pour]: in *bot.*, the fundamental tissue out of which by differentiation other tissues arise.

PROTENSE, n. *prō-tēns'* [L. *pro*, before; *tensus*, stretched—from *tendĕre*, to stretch]: in *OE.*, extension.

PROTERANDROUS: see PROTANDROUS.

PROTERANTHOUS, a. *prō'tĕr-an'thŭs* [Gr. *protĕros*, sooner; *anthos*, a flower]: in *bot.*, applied to flower-buds that expand before the leaf-buds.

PROTERIAN, n. *prō-tēr'i-an*: in *chh. hist.*, orthodox party in Alexandria named from Proterius (Bp. of Alexandria 452–457), who was barbarously murdered.

PROTEROGYNOUS: see under PROTOGYNOUS.

PROTEROPS, n. *prō'tĕr ŏps* [Gr. *proteros*, anterior; *ops*, eye]: genus of hymenopterous insects of the family *Ichneumonidæ*: the typical species is native of Belgium.

PROTEROSAURUS, n. *prō'tē-rō-saw'rŭs*, or PROTOSAURUS, n. *prō'tō-saw'rŭs* [Gr. *protĕros*, earlier; *prōtos*, first; *sauros*, a lizard]: the Permian fossil monitor of Thuringia, long the earliest-known fossil reptile.

PROTEROZOIC ERA, *prō-tĕr-o-zō'ik* [Gr. *proteros*, anterior, prior; *zoon*, animal, living thing]: that period or tract of geologic time in which are first seen living organisms: the time anterior to the P. E. is called *Azoic* (i.e., void of life). The divisions of geologic time which succeed the P. E. are the *Paleozoic*, the *Mesozoic*, and the *Cenozoic* epochs. In the terminology adopted by the writers and editors of the reports of the U. S. geological survey the P. E. is commonly termed the *Algonkian Era*.

PROTERVITY, n. *prō-tĕr'vĕ-tĭ* [L. *protervitas*, from *protervus*, wanton, petulant]: peevishness, petulance.

PROTEST, n. *prō'tĕst* [F. *protester*, to protest: L. *protestāri*, to protest—from *pro*, before; *testor*, I bear witness; *testis*, a witness: It. *protestare*: Sp. *protestar*]: a solemn or formal declaration of opinion against some act or resolution; the written paper containing reasons of dissent from a motion or resolution; in a *bill of exchange*, a declaration against, made by a notary public,

for non-acceptance or non-payment: V. *prō-tĕst'* to make or enter a solemn declaration expressive of opposition; to make a solemn declaration of a fact or opinion; to mark or note, through a notary public, a bill of exchange for non-payment or non-acceptance; in *OE.*, to prove; to show; to call as a witness. PROTEST'ING, imp. PROTEST'ED, pp. marked or declared against for non-payment, as a bill of exchange. PROTEST'ER, n. *-ĕr*, one who protests. PROTESTATION, n. *prŏt'ĕs-tā'shŭn* or *prō'tĕs-* [F.—L.]: a formal declaration of dissent; solemn declaration of fact, opinion, or resolution. PROT'ESTA'TOR, n. *-tĕr*, one who protests. PROTEST'INGLY, ad. *-lĭ.*—SYN. of 'protest, v.': to assert; affirm; declare; profess; asseverate; aver; attest; testify; avow.

PROTESTANT, n. *prŏt'ĕs-tănt* [F. *protestant*, a Protestant—from L. *pro*, before; *testor*, I bear witness: It. *protestante*]: term applied first to the adherents of Luther, from their protesting against the decree passed by the Rom. Cath. states at the second diet of Speier 1529. This decree had forbidden any further innovations in religion, and enjoined those states that had adopted the Reformation so far to retrace their steps as to reintroduce the Mass, and order their ministers to avoid disputed questions, and to use and explain the Scriptures no otherwise than as they had hitherto been used and explained in the church. The term is applied generally to all Christian denominations that differ from the Church of Rome, but is restricted to those that sprang from the Reformation. The essential principles involved in the protest, and in the arguments on which it was grounded, were: 1. That the Rom. Cath. Church cannot be the judge of the Reformed churches, which are no longer in communion with her. 2. That the authority of the Bible is supreme, and above that of councils and bishops. 3. That the Bible is not to be interpreted and used according to tradition or use and wont, but to be explained by means of itself—its own language and connection. As this doctrine, that the Bible explained independently of all external tradition, is the sole authority in all matters of faith and discipline, is really the foundation stone of the Reformation, the term P. was extended from those who signed the Speier protest, to all who embraced the fundamental principle involved in it; and thus P. churches became synonymous with Reformed churches. The essence of Protestantism, therefore, does not consist in holding any special system of doctrines and discipline, but in the source from which, and the way in which it proposes to seek for the truth in all matters of faith and practice: thus a church might, in the progress of research, see reason to depart from special points of its hitherto received creed, without thereby ceasing to be Protestant. The Symbols or Confessions of the P. churches were not intended as rules of faith for all time, but as expressions of what was then believed to be the sense of Scripture. When, at a later time, it was

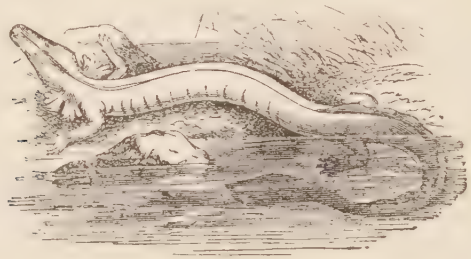
sought to erect them into unchangeable standards of true doctrine, this was a renunciation of the first principle of Protestantism, and a return to the Rom. Cath. principle; for in making the sense put upon Scripture by the Reformers the standard of truth, all further investigation of Scripture is arrested, the authority of the Reformers is set above that of the Bible, and a new tradition of dogmas and interpretation is created, which differs from the Rom. Cath. tradition only in beginning with Luther and Calvin, instead of with the apostolic fathers. PROTESTANT, a. of or relating to Protestants, or their doctrines or forms of religion. PROTESTANTISM, n. *-izm*, the principles or religion of Protestants: see REFORMATION: RELIGION.

PROTESTANTENVEREIN, *prō-tēs-tān'tēn-fēr-īn* [Ger. *Protestant*, and *verein*, union]: German Protestant association founded at Frankfort on the Main, 1863 at a meeting of clergy and laity representing the liberal sentiment of the different Lutheran and Reformed churches throughout Germany. Among the founders of the P. were Bluntschli and Bunsen, and Profs. Ewald, Rothe, Schenkel, Hitzig, and Hilgenfeld. The objects of the P. are: development of the parochial and synodal features of chh. govt.; participation of the laity in the conduct of church affairs; federation of all the sects into a national chh.; opposition to hierarchism and clericalism both within and without the Protestant churches; opposition to state interference in religious affairs assertion of the right of all Christians, whether lay or clerical, freely to search for the truth, and freely to proclaim it; resistance to the claims and demands of the Roman curia and the Rom. Cath. episcopate. A general meeting of the P. is held every second year. There are provincial associations for n.w. Germany, Baden, Silesia, etc.; these hold annual meetings. The aims of the P. as a whole are not regarded with favor by the orthodox sections of the Prot. churches: in Prussia, attempts more or less successful have from the first been made to exclude from church preferment and from professorial chairs in the universities men identified with the association. In 1880 the P. had 26,000 members: the membership has since declined.

PROTESTANT EPISCOPAL CHURCH: see EPISCOPAL CHURCH, PROTESTANT: EPISCOPACY.

PROTEUS, *prō'tē-ŭs:* genus of perennibranchiate Batrachia (*q* v.), having a long, smooth, naked, eel-like body; four small and weak legs; the fore-feet three-toed, the hinder, four-toed; the tail compressed and forming a kind of fin; the head lengthened and flattened; the eyes extremely small, covered by the skin; the ears concealed in the flesh; the gills external and permanent, reddish, very conspicuous, between the head and the fore-legs. Notwithstanding the permanent external gills, there are also lungs in the form of simple slender tubes, terminated by a vesicular dilatation. The only known species,

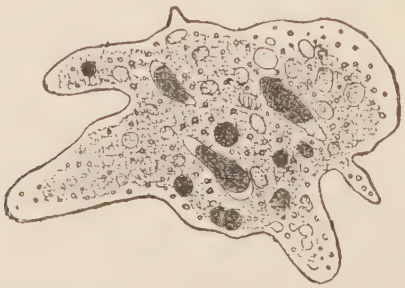
P. anguinus, is found in subterranean lakes, in the great limestone caverns in Carniola. It seems to live chiefly in the mud which forms the bottom of the lakes or pools; but almost nothing is known of its habits. It is of pale rose or flesh color, 10 or 12 inches long, seldom more



Proteus (*P. anguinus*).

than half an inch in thickness. Specimens have been kept alive in confinement for several years, in a darkened aquarium, apparently without food. One which ate a worm died soon after. The blood-corpuscles of the P. are extremely large.

PRO'TEUS: name given by many naturalists to certain animalcules remarkable for changefulness of form; on which account also—as the name P. has been otherwise appropriated in science—they now receive the generic name *Amœba* [Gr. vicissitude]. They are *Pro-*



Proteus or Amœba (very highly magnified).

tozoa, and ranked among the *Rhizopoda* (see these titles). They are found in fresh water, and are generally from $\frac{1}{300}$ to $\frac{1}{600}$ of an inch in diameter, when they assume a somewhat globose form, which, however, they exchange for almost every imaginable shape, so that they cannot be described as having any proper or definite shape whatever. They consist of a transparent gelatinous substance (*sarcode*), or protoplasmic matter, divisible into two layers, outer (*ectosarc*) and inner (*endosarc*).

The ectosarc is highly contractile, and can be protruded into blunt finger-like processes called *pseudopodia* (false-feet), by which the animal is enabled to move, and by which it procures its food, such as a diatom, which it draws into its substance, there being no mouth; and the effete matters are ejected from any part of its circumference. These pseudopodia can be protruded from any part of the surface, and can be again retracted, at the wish of the animal. The only organs present in these animals is the *nucleus*—a dark, solid, refractive body whose function is unknown: the *contractile vesicles*, spaces filled with fluid, and pulsating rhythmically; and other spaces called *food vacuoles*. Reproduction takes place either by fission; or a single pseudopodium separates and becomes a fresh amœba; or by the separation of a little mass of sarcode from the interior, the animal having become quiescent, and the nucleus and contractile vesicles disappearing: these little masses develop into ordinary amœba.

PROTEUS, *prō'tē ŭs* or *prō'tūs*, in the Homeric or Oldest Greek Mythology: a prophetic 'old man of the sea' (*halios gerōn*), who tends the seal-flocks of Poseidon (Neptune), and has the gift of endless transformation. His usual abode, according to Homer, is the isle Pharos, off the Canopic mouth of the Nile; but according to Virgil, the island of Carpathos [now *Scarpanto*], between Crete and Rhodes. Here he rises at mid-day from the floods, and sleeps in the shadow of the rocky shores, surrounded by the monsters of the deep. This was the time when those who wished to make him prophesy sought to catch him. But it was no easy task. P., unlike most vaticinal personages, was very unwilling to prophesy, and tried to escape by adopting all manner of shapes and disguises. When he found his endeavors hopeless, he resumed his proper form, and then spoke out unerringly about the future.

PROTHALAMIUM, n. *prō'thā-lā'mĭ-ŭm* [Gr. *pro*, before; *thalămos*, a bed-chamber, a bridal chamber]: the song addressed to, or in honor of, the bride and bridegroom, and which opened the marriage ceremonies; opposed to *epithalămĭum*, which concluded them.

PROTHALLUS, n. *prō-thăl'lŭs*, or PROTHAL'LIUM, n. *-lĭ-ŭm* [Gr. *pro*, before; *thallos*, a sprout]: in *bot.*, a name applied to the first results of the germination of the spore in the higher cryptogams, as ferns, horse-tails, etc.

PROTHESIS, n. *prŏth'ē-sis* [Gr. *prothĕsis*, a placing before—from *pro*, before; *thĕsis*, a putting or placing; *tithēmi*, I place]: the place where the elements of the Eucharist are put before being set on the altar; the credence-table.

PROTHETIC, a. *prō-thĕt'ĭk'*: for PROSTHETIC.

PROTHONOTARY, *prō-thŏn'ō-tā-rĭ*, of the Court of Rome: one of a college of 12 notaries, appointed by the Holy See, distinct from honorary or extraordinary apostolic notaries. They are said to date from a very early time, and are charged with official registration of all solemn acts of the pope; whence they have very special duty in relation to canonization of saints, etc. They have many privileges, beyond those of an apostolic notary-extraordinary, though he also is called prothonotary. The prothonotary extraordinary may be named not only by the pope, but also by a LEGATE (q.v.), and under certain restrictions, by the Roman College of Notaries.

PROTHONOTARY, n. *prō-thŏn'ō-tā-rĭ*, or PROTONOTARY, *prō-tŏn'ō-tā-rĭ* [Gr. *prōtos*, first; L. *nōtārĭus*, a scribe: It. *protonotario*: F. *protonotaire*]: chief notary or clerk; originally the chief or principal notary of the Emperor of the East: in *England*, one of the officers in the former court of king's bench, afterward superseded by the master: in *Rome*, one of the chief secretaries of the chancery (see above): in *U.S.*, a registrar or clerk of certain courts. PROTHON'OTARYSHIP, n. office of a prothonotary.

PROTHORAX, n. *prō-thō'răks* [Gr. *pro*, before; *thōrax*, a breastplate]: in *entom.*, the first or anterior segment of the thorax in insects.

PROTISTA: see PROTOCTISTA.

PROTO-: see PROT.

PROTOCOCCUS, *prō-tō-kŏk'kŭs* [Gr. first-grain]: genus of *Palmellaceæ* (q.v.), to which Red Snow (q.v.) is commonly referred.—Another species is *P. pluvialis*, frequent in stagnating rain-water. It passes through various stages of growth, in which it has been described under various generic and specific names. In some of its stages, in which it moves by means of two long cilia, it has often been mistaken for an animalcule. Its color is usually green, but sometimes red; and the red matter often appears as a mere central nucleus, which has been mistaken for the *eye* of the animalcule. In its ordinary form, it consists of a mass of colorless *protoplasm* (see CELL-THEORY), with red or green granules diffused in it, surrounded by a *primordial utricle* (see CELL-THEORY), and undergoing division into halves, which are soon surrounded by separate envelopes, and undergo division again; the new cells thus formed (and they are formed with great rapidity) being sometimes set free by the dissolution of the original enveloping membrane, more frequently remaining imbedded in a gelatinous substance formed from it. The new cells often send forth two vibratile filaments or cilia, which spring almost from one point, often a kind of beak; and move with considerable rapidity; and in this state also they multiply by binary subdivision; or they rest, become *encysted*, and divide into four. If slowly dried, *P. pluvialis* retains life, and resumes its functions when moistened.

PROTOCOL, n. *prō tō-kŏl* [F. *protocole*, a register—from Gr. *prōtos*, first; *kolla*, glue: mid. L. *protocollum*, a register of public acts made up into a book by gluing the leaves together by their edges]: in *diplomacy*, the minutes or rough draft—more specifically, the original copy—of a treaty, dispatch, or other document; a record or registry; a notary's minute or record of an act. *Note.*—PROTOCOL, *literally*, 'glued the first,' referring to public acts made up into a book by gluing their leaves edge to edge; it is used also in the sense of 'a friendly diplomatic document or minute of proceedings, signed by friendly powers, in order to secure certain political ends peacefully;' Gr. *prōtŏkol'lon* is a Byzantine term denoting the first sheet pasted on a MS. roll, stating by whom it was written, etc.; the first leaf of a book, or that on which the official mark was put—see Wedgwood and Brachet.

PROTOCTISTA, n. *prō'tŏk-tĭs'tă*, or PROTISTA, n. *prō-tĭs'tă* [Gr. *prōtos*, first; *ktista*, created beings—from *ktizein*, to create]: a term proposed to embrace those minute organisms which seem to stand on the confines of the vegetable and animal kingdoms.

PROTOGENES, n. *prō tŏj'ĕn-ēz* [Gr. *prōtos*, first; *genos*, birth, race]: genus of amœbiform protozoans, low form of the *Monera* (q.v.). PROTOGENIC, a. *prō tō-jĕn'ĭk*, in *geol.*, crystalline or fire-formed rocks, in contradistinction to *deutrogenic*, or those formed from them by mechanical actions.

PROTOGENES, *prō tŏj'ĕ-nēz*: ancient Greek painter: b. at Caunus in Caria; practiced his art at Rhodes in the last half of B.C. 4th c.; d. prob. about B.C. 300. Very little is known concerning him, except that he was a contemporary and friend of Apelles, to whose extraordinary gifts, P. first was the means of drawing the attention of the Rhodians (see APELLES). Pliny says that when Demetrius Poliorkē'tes was endeavoring to conquer Rhodes (B.C. 305,4) he took great precautions to prevent any injury from happening to the studio of P., who then lived in a little cottage (*casula*) on the out-skirts of the city, and even stole away at times from the turmoils of the siege to visit the painter, quietly and earnestly pursuing his work amid 'the din of arms and the thunder of the battering-engines.' He was a most careful and elaborate painter, sparing no pains to secure brilliant, natural, and finished workmanship—laboring it is said seven years on his Ialysus; and was apparently held in the highest estimation by the ancients. None ranked above him except Apelles. Cicero says that his pictures were perfect in every respect. The principal were *A Satyr resting and holding his Pipes; The Paralos and Ammonias* (or sacred ships of the Athenians, executed for the Propylæa at Athens); and *The Thesmothetæ* (for the Athenian Senate-house of the Five Hundred). He was a sculptor also.

PROTOGINE, n. *prō'tō-jīn* [Gr. *prōtos*, first; *ginomai*, I am formed]: granitic rock, composed of the same ingredients as true granite, except that the mica is replaced by talc. It received its name because it was supposed to have been the *first-formed* granite. It is called also Alpine Granite, and Protogine Granite. It abounds in the Alps; and is found in Cornwall, England. The clay produced by its decomposition is greatly valued for the manufacture of china.

PROTOGYNOUS, a. *prō-tŏj'i-nŭs*, or PROTEROGYNOUS, a. *prō'tĕr-ŏj'i-nŭs* [Gr. *prōtos*, first; *protĕros*, earlier; *gunē*, a woman]: in *bot.*, having the pistil reaching maturity before the stamens. PROTOGYNY, n. *prō-tŏj'i-nĭ*, the state or condition of a plant in which the pistil arrives at maturity before the stamens.

PROTOHIP'PUS: see HORSE, FOSSIL.

PROTOMARTYR, n. *prō'tō-mär'tĕr* [*prōtos*, first; *martus* or *martŭra*, a witness]: the first martyr, St. Stephen; the first who suffers in any cause.

PROTONOPSIS: see MENOPOME.

PROTONOTARY, n. *prō'tō-nō'tĕr-ĭ*: see PROTHONOTARY.

PROTOPAPAS, n. *prō'tō-pāp'ās* [Gr. *prōtos*, first; *pappas*, a father]: in *Russia*, the chief pope or imperial confessor; one of the clergy of the first rank in cathedrals.

PROTOPHYTA, *prō-tŏf'i-ta* [Gr. *prōtos*, first; *phuton*, plant]: class embracing certain of the lowest plants. They are mostly microscopic and unicellular, with little or no differentiation of cells even when these cohere; and they reproduce by fission or by internal self-division, having no sexual elements yet discovered. They inhabit water or damp ground. Some do not differ visibly from Protozoa, and are placed as plants by reason only of forms connecting them with undeniable plants. The lowest, with the lowest Protozoa, were made a sub-kingdom, Protista, by Haeckel. The first division is the slime molds (*Myxomycetes*), which stand alone; in their growing stage they are often masses of yellow, brown, or purple jelly, with amœba-like movements and forms, and are found on the surface of decaying wood or leaves; afterward they change to minute spores, with cell-wall and chlorophyl. Seven families of them have been constituted. The next division is the *Schizomycetes*, minute, unicellular, and multiplying by fission as the name indicates [Gr. *schizo*, I cleave]; they include the bacteria of many kinds, such as dots, rods, spirals, etc., the yeast-plant, and other forms. Next are the group *Cyanophyceæ*, mostly blue-green, some of them small, jelly-inclosed spheres, on wet rocks (e.g., *Chroococcus*), others a scum on water; also the Nostocs and Oscillatoria, filaments with power of movement; the Rivularia, and other forms, some radiating from or imbedded in a small mass of jelly, while some, like Protococcus form the 'red snow,' or,

in a common species of the same genus, cover walls with a green paint, which is a sign of dampness, not a source of disease as the unlearned suppose. Some of the coccoid species are the gonidia or lodgers in the cell-chambers of lichens, in thin sections of which they can be seen as green balls, by means of the microscope. The spores of many P. have rapid motion in water, either with or without discoverable cilia. Of the highest P., some have the filaments branched, and certain of the cells are differentiated into thick-walled spore-cells. P. are too perishable, except doubtful spores, to be found fossil. The P. of some geologists (e.g., Dana) are not P. proper, but include desmids and diatoms of the higher *Zygosporeæ*.

PROTOPLASM, *prō'tō-plăzm*, or PRO'TOPLAS'MA, n. *-plăz'mă* [Gr. *prōtos*, first; *plasma*, what has been formed, an image—from *plassō*, I mold]: the physical basis of animal and vegetable life, a semi-fluid, glairy, homogeneous, or granular substance, of a consistence like the white of a raw egg—an albuminous substance containing carbon, hydrogen, oxygen, nitrogen, and sulphur, which is essential to the processes of life; sarcode (see CELL-THEORY): it is called also Bioplasm, and Plasmogen. PRO'TOPLAS'MIC, a. *-mĭk*, pert. to the first growth or formation; pert. to the material of formation of living bodies. —*Protoplasm*, under high microscopic power, often shows a more or less definite structure, composed of fibrils more or less regular, and in some instances grouped into a honeycombed or fibrillar network, in the meshes of which is a homogeneous inter-stitial substance. The closer the meshes, the less there is of the inter-stitial substance, and the more regularly granular does it appear. The determination of the precise chemical nature of P. is the supreme problem of physiological chemistry. As to the minute structure of P., several hypotheses have been offered: thus Herbert Spencer resolves P. into 'physiological units,' Haeckel into 'plastidules,' Engelmann into 'contractile units.'—The two processes of anastasis (building up) and katastasis (decomposition) are ever going on in P.: thus on the one hand there is never-ceasing development of waste-products, and on the other a continual intussusception of new matter. This new matter is either a ready-formed protoplasmic material (supplied by animal or plant tissues), or it consists of the elements of P., united in simpler combinations, which consequently have to be transformed into P. by the agency of the living matter itself.

PROTOPLAST, n. *prō'tō-plăst* [Gr. *prōtoplastos*, first formed—from *prōtos*, first; *plastos*, formed; *plassō*, I mold]: the thing first formed, as a copy to be followed or imitated; the first individual, or pair of individuals, of a species. PRO'TOPLAS'TIC, a. *-tĭk*, first formed.

PROTOPODITE, n. *prō-tŏp'ō-dīt* [Gr. *prōtos*, first; *pous* or *pŏda*, a foot]: in *zool.*, the basal segment of the typical limb of a crustacean.

PROTORNIS, n. *prō-tôr'nis* [Gr. *prōtos*, first; *ornis*, a bird]: the most ancient example known of a passerine fossil bird, of or about the size of a lark, and somewhat similar to it.

PROTOSPORES, n. *prō'tō-spōrz* [Gr. *prōtos*, first; *spora*, a seed]: in *bot.*, the spores of the first generation.

PROTOTYPE, n. *prō'tō-tīp* [Gr. *prōtos*, first; *tupos*, a type or mold: *tuptō*, I strike]: the original from which others are copied; the primary form to which others in their principal features or characteristics bear resemblance.

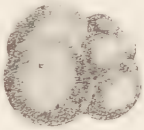
PROTOXIDE, n. *prō-tŏks'īd* [Gr. *prōtos*, first, and Eng. *oxide*]: in *chem.*, a compound containing one equivalent of oxygen combined with one of another element—that is, the first oxide—and so of numerous other words similarly formed.

PROTOZOA, *prō-tō-zō'â* [Gr. *prōtos*, first; *zoon*, animal]: lowest branch of the animal kingdom, mostly microscopic, theoretically representing a single cell or mass of protoplasm; characterized by the absence or mere rudiments of distinct organs, and reproducing by fission or by internal segmentation into motile germs. The lowest class, MONERA of Haeckel, containing Protamœba, etc., does not differ from Amœba of the next class, RHIZOPODA, except that no nucleus or contractile vacuole has been discovered. In the Rhizopoda, besides granules and the pseudopodia (temporary root-like projections) as in the first class, there is a more distinct outer cortical mass. In the order *Foraminifera*, the naked Amœba (q.v.), common in pools, glides along by extension of the cortex in any direction and shape, the more liquid granular interior following; the vacuoles seem to be extemporized stomachs. The higher Foraminifera are like Amœba, but of fixed form, and secreting shells of lime or chitin, or enveloping themselves in a coat of sand, and putting forth pseudopodia through one or more perforations (foramina); by budding symmetrically they assume the shape of spheres arranged spirally, and other forms: example Globigerina (q.v.). The higher order, *Radiolaria*, somewhat more differentiated, secrete siliceous shells of varied and often art-like forms; they were formerly known as Polycystines; e.g., the sun-animalcule (*Actinophrys sol*) of fresh-water, and many fossil species in misnamed 'infusorial earth.' The third class, GREGARINIDA, is illustrated by a parasite of the lobster, passing through six stages, one of which is hair-like, ½ in. long; another stage is amœba-like. The fourth class, INFUSORIA, is named from the appearance of many of its forms in putrid vegetable or animal infusions; other forms are common in pools. They have a rudimentary mouth, œsophagus, and stomach; many are conjugate; some are free, others stalked. The order *Flagellata* contains round, oval, or pear-shaped forms, with one or two thread-like whips,

Gromia oviformis. (Magnified 100 diameters.)

b a

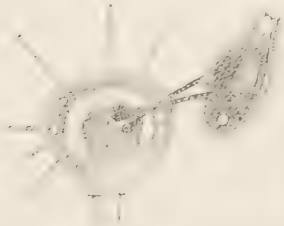
Dendritina elegans: a. side view; b front view. (Highly magnified.)



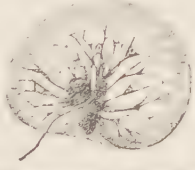
Orbulina. (Magnified.)

Globigerina communis. (Magnified.

Microscopic mussels: Stylonychia mytilus. (Highly magnified.)



Acineta, by its 2 tentacles holding a small infusorium, and sucking it up. (Highly magnified.)



Phosphorescent infusorium: Noctiluca miliaria (Magnified 100 diameters.)

Bell animalcule Epistylis nutans.

usually thrown forward to sweep prey in to the mouth, but sometimes locomotory, as in the phosphorescent marine Noctiluca. The order *Tentaculifera* is characterized by radiating, straight, hollow, retractile arms, some having a sucking disk at the end. The order *Ciliata* contains the true Infusoria, moving by many thread-like cilia, and includes the common forms in infusions and pools, as well as stalked forms in the shape of trumpets or bells. The bell-animalcule (*Vorticella*) is interesting under the microscope; in pools it appears like white mold on submerged stems and leaves of plants. Like most of its order it has an anterior vibratile circlet of cilia. PRO'TOZO'AN, n. one of the Protozoa. PRO'TOZO'IC, a. *-zō'ik*, belonging to the Protozoa; containing the first traces of life.

PROTRACT, v. *prō-trăkt'* [L. *protractus*, protracted—from *pro*, forth; *trahĕrĕ*, to draw]: to draw out or lengthen in time; to delay; to defer. PROTRACT'ING, imp. PROTRACT'ED, pp: ADJ. drawn out; lengthened out. PROTRACT'ER, n. *-ĕr*, one who protracts or lengthens in time. PROTRAC'TION, n. *-trăk'shŭn*, the act of delaying the termination of a thing: in *surv.*, the plotting or laying down dimensions on paper, as of a field. PROTRACT'IVE, a. *-ĭv*, tending to delay; dilatory. PROTRACT'OR, n. *-ĕr*, a math. instr. for laying down and measuring angles on paper that have been taken in the field; in *anat.*, a muscle that draws forward any part; in *surg.*, an instr. for drawing extraneous bodies out of a wound. PROTRACT'EDLY, ad. *-lĭ*.

PROTRUDE, v. *prō-trōd'* [L. *protrūdĕrĕ*, to thrust forward—from *pro*, forward; *trūdo*, I thrust]: to thrust forward; to thrust or put out; to thrust forward beyond the usual limits; to shoot forward. PROTRUD'ING, imp. PROTRUD'ED, pp. PROTRU'SION, n. *-trō'zhŭn* [L. *protrūsus*, thrust forward]: the act of thrusting forward beyond the usual limit; a push. PROTRU'SILE, a. *-sĭl*, that may be protruded and withdrawn. PROTRU'SIVE, a. *-sĭv*, thrusting or impelling forward.

PROTUBERANT, a. *prō-tū'bĕr-ănt* [mid. L. *protūbĕrans* or *protuberan'tem*, swelling out—from L. *pro*, forth; *tūber*, a hump or hard excrescence: It. *protuberanza*: F. *protubérance*, a protuberance, a prominence]: prominent or bulging beyond the surrounding surface; swelling. PROTU'BERANTLY, ad. *-lĭ*. PROTU'BERANCE, n. *-ăns*, a swelling; a rounded prominence; a bunch or knob. PROTU'BERATE, v. *-āt*, to swell out; to be prominent and bulging beyond the level surface; to bulge out. PROTU'BERATING, imp. PROTU'BERATED, pp. PROTU'BERA'TION, n. *-ā'shŭn*, the act of swelling beyond the surrounding surface.

PROUD, a. *prowd* [AS. *prut*, proud: Dan. *prud*, stately: Ger. *protzig*, saucy, insolent: Dut. *pratten*, to show arrogance, to pout; *prat*, proud (see PRIDE)]: having inordinate self-esteem; lofty of mien; grand of person; exciting legitimate pride; possessing an unreasonable opinion of one's own excellence; conceited; arrogant; haughty; diseased or fungous, as *proud* flesh, which is the popular name for coarse or too luxuriant Granulations (q.v.) springing up in wounds or on ulcerated surfaces: such granulation is treated with nitrate of silver or sulphate of copper. In *OE.*, eager for the male. PROUD'LY, ad. *-lī*, ostentatiously; with lofty mien. PROUD'ISH, a. *-ish*, somewhat proud. PROUD-HEARTED, a. having a proud spirit.—SYN. of 'proud': elated; arrogant; haughty; impatient; daring; presumptuous; grand; lofty; splendid; magnificent; ostentatious.

PROUDHON, *prō-dōng'*, PIERRE JOSEPH: noted French publicist and speculator on social and economic subjects: 1809, July 15—1865, Jan. 19; b. Besançon, in which town his father was a poor cooper. Through the good offices of charitable friends, he received the rudiments of education at the college of his native place, and from the first gave promise of talent. While still very young, however, he quitted the institution to aid his family, which had fallen into poverty, and sought employment in a printing establishment. Here he was noted for punctual discharge of duty; and in the hours not occupied in work, he contrived to complete and extend his education. In 1830, he declined an offer of the editorship of a ministerial journal, preferring honorable independence as a workman to the career of a writer pledged to the support of authority. He became partner 1837 with Lambert and Maurice in development of a new typographical process; was engaged on an ed. of the Bible, to which he contributed notes on the principles of the Hebrew language; and 1838, published *Essai de Grammaire Générale;* in approval of which, a triennial pension of 1 500 francs was awarded to him by the Académie de Besançon. On this accession of funds, he paid a visit to Paris; and subsequently contributed to the *Encyclopédie Catholique* of M. Parent Desbarres the articles Apostasie, Apocalypse, and others. In 1840, he issued the work entitled *Qu'est-ce que la Propriété?* afterward famous. The nature of the doctrine announced in it is sufficiently indicated in its bold paradox, soon to be widely popularized—*La Propriété, c'est le Vol.* At the moment, it attracted little notice; and the sole results to its author were the withdrawal of his pension by the Acad. on the score of his noxious opinions, and the threat of a prosecution, which, however, was omitted at the instance of Blanqui, the political economist, to whom reference in the matter was made. In 1842, for a repetition of offense in his *Avertissement aux Propriétaires*, he actually *was* prosecuted before the cour d'assises of Besançon, but obtained acquittal. P. was employed at

Lyon, 1843-47, under MM. Gauthier, in the superintendence of a scheme of water-transport on the rivers Saône and Rhône; publishing during this time at Paris the two works *De la Création de l'Ordre dans l'Humanité* and *Système des Contradictions Économiques*.

With the revolution of 1848, Feb., the opportunity of P. had arrived. He instantly went to Paris, and Apr. 1. he came before the public as ed. of the *Représentant du Peuple*, instantly, by his fierce and vigorous advocacy of extreme democratic and socialistic opinions, making his mark as a leading figure of the hour. His paper was suppressed in Aug. following; but meantime, June 4, no less than 77,094 enthusiastic admirers had voted him into the constituent assembly as representative of the dept. of the Seine. His career as a senator brought him at least notoriety. *La Propriété, c'est le Vol*, though a maxim much commending itself to the moral sense of the hungry masses, naturally failed to find like acceptance with an audience mostly with some sous in the pocket. P. soon ceased to address the assembly, for, as soon as he ascended the tribune, the indignant roar which saluted him rendered audible speech impossible. Under these circumstances, P. again betook himself to his pen, and, as ed. of three daily journals in succession, avenged himself on the adversaries who declined to listen to him, the chief victims of his savage personalities being Ledru Rollin, De Lamartine, Louis Blanc, Considerant, Cavaignac, etc. All three papers—*Le Peuple* (1848, Nov. 23—1849, Apr.), *La Voix du Peuple* (1849, Oct.—1850 May), *Le Peuple de* 1850 (June 15—Oct. 13)—were in turn suppressed as anarchic and obnoxious. During their continuance, he was repeatedly subjected to fines, which were defrayed for him by popular subscription.

In 1849, Jan. he attempted a reduction of his theories to practice by institution of a *Banque du peuple*. This project, which had for its object *la suppression du capital*, speedily experienced at the hands of 'capital' the fate it had intended to inflict. The bank was closed by authority, and its originator fled to Geneva, to escape threatened imprisonment. In June, however, he returned, and his next three years were passed in the prison of St. Pelagie. While shut up there, he married. During his imprisonment, he gave to the world the works *Confessions d'un Révolutionnaire* (1849), *Actes de la Révolution* (1849), *Gratuité du Crédit* (1850), and *La Révolution Sociale démontrée par le Coup d'Etat* (1852); the last of which is remarkable, in the light of subsequent events, for the clearness with which it states the alternative *l'anarchie ou le Césarisme*, as pressed on Louis Napoleon, then president. 1852, June, he was set at liberty; and quitting Paris, no longer a desirable abode for such unquiet spirits, went to Belgium, where he continued to publish on his favorite subjects of speculation. He died in obscurity at Paris.

Monstrous as are the social theories with which, in the history of his time, the name of P. remains con-

nected, his power as a writer is not to be denied. In personal character P. was singularly pure, and he fiercely opposed those socialist leaders of France whose systems involved immorality. In private life he was affectionate and kindly. It may be questioned how far he was at any time the dupe of his own paradoxes, or blind to the utter insufficiency of the premises from which, with a show of scientific rigor, he evolved his portentous results. It is related that in the negotiation of his marriage, he was very sharply solicitous as to the disposal of certain property possessed by the lady; and that on her notary venturing some surprised allusion to the famous *La Propriété, c'est le Vol*, the philosopher gravely replied: 'Be pleased, my dear sir, on such an occasion as the present, to be, if possible, a little serious.'

PROUSTITE, n. *prō-ū'stīt* [after *Proust*, a French chemist]: an ore of silver, consisting of the sulphide of that metal and arsenic.

PROUT, *prowt*, SAMUEL: English painter in water-colors: 1783, Sep. 17—1852, Feb. 10; b. Plymouth. He evinced strong love for nature at an early age, and his drawings for Britton's *Beauties of England and Wales* attracted so much notice in London, that he was induced to make his residence in that city. He was about 35 years of age when he casually found his true sphere: in 1818, journeying for health, he went to Rouen by Havre; and the picturesque street-architecture and fine Gothic remains there made so strong an impression on his mind, that afterward his principal works were those in which architecture was prominent; and from time to time he made excursions, ransacking the nooks of France, Germany, the Netherlands, and Italy, for picturesque architectural remains. Even in P.'s numerous elementary drawing-books, talent and feeling for art are conspicuous. His water-color drawings are characterized by decision in handling, great breadth, and clear and pleasing coloring; good specimens are highly valued. See Ruskin's Memoir of P. in *Art Journal* (1852); and his *Notes on the Loan Collection of Drawings by Prout and Wm. Hunt* (1879–80).

PROVE, v. *prôv* [AS. *prófian*, to try: Ger. *proben;* F. *prouver;* It. *provare* to prove—from L. *probārĕ*, to try, to test]: to ascertain by trial or comparison; to subject to trial or test; to verify; to demonstrate; to gain knowledge by experience; to deposit and register for probate, as a will; to be found by experience; to turn out; to be ascertained by the event; in *OE.*, to succeed. PROV'ING, imp. PROVED, pp. *prôvd:* ADJ. found by experience. PROVEN, pp. *prôv'n*, in *Scotch law*, proved, as in the verdict of acquittal *not proven*, which does not express the opinion of the jury that the accused is innocent, but only that on the evidence they cannot find him guilty. PROVER, n. *prôv'ér*, one who proves; one who tests by sample or average to ascertain the value of the

whole. PROV'ABLE, a. *-ă-bl.* that may be verified or proved. PROV'ABLY, ad. *-blĭ.*—SYN. of 'prove': to verify; demonstrate; show; justify; argue; try; test; confirm; establish; evince; manifest; experience; endure.

PROVEDITOR, n. *prō-vĕd'ĭ-tĕr*, or PROVEDORE, n. *prŏv'ē-dōr* [It. *provveditore*, a purveyer or provider—from *provvedere*, to provide: L. *providĕō*, I provide—from *pro*, before; *vidĕō*, I see]: one employed to procure supplies for the army; in *Italy*, an officer who superintends matters of policy; in *Amer.*, an officer engaged in treaties with the Indians, etc.

PROVEN: see under PROVE.

PROVENÇAL, a. *prō-vŏng-săl.* PROVENCIAL, *prō-vĕn'-shăl* [F. *Provençal*—from L. *provinciā*, a province]: of or from Provence. PROVENÇAL LANGUAGE AND LITERATURE (see ROMANIC LANGUAGE: TROUBADOUR). PROVENCE, a. *prŏv-ŏngs'*, of or from Provence in France, as a Provence rose.

PROVENCE, *prō-vŏngss'*: formerly a maritime province of France, in the extreme s.e. of the country, was bounded on the s. by the Mediterranean, and comprised the modern depts. of Bouches du Rhone, Var, Basses-Alpes, and the s. part of Vaucluse. It included a portion of the territory belonging to the Roman province of Gaul generally called simply *Provincia* ('the Province'), whence it derived its name.

PROVENCE-OIL, n. *prŏv'ĕns-oyl*: olive oil obtained by cold pressure from the ripe fruits immediately after gathering.

PROVENDER, n. *prŏv'ĕn-dĕr* [F. *provende*: It. *profenda*; Dut. *provende*, provisions—from mid. L. *præbenda*, a daily allowance of provisions]: dry food for beasts, as hay, corn, etc.; provisions.

PROVENTRICULUS, n. *prŏv'ĕn-trĭk'ū-lŭs* [L. *pro*, in front of; *ventrĭc'ălus*, the stomach—from *venter*, the belly]: the cardiac portion of the stomach of birds.

PROVERB, n. *prŏv'érb* [F. *proverbe*—from L. *proverbĭŭm*, an old saying—from *pro*, for; *verbum*, a word: It. *proverbio*]: short pithy sentence conveying some useful lesson of prudence or morality; a wise or shrewd saying, enforced by association and experience; a maxim; an adage; quaintly defined by Howell as 'sense, shortness, and salt'; a by-word of reproval or contempt; in *Scrip.*, an enigmatical sentence or maxim (see PROVERBS): V. in *OE.*, to provide with a proverb; to mention in a proverb; to utter proverbs. PROV'ERBING, imp. PROV'ERBED, pp. *-érbd.* PROVERBS, book in the Old Test. Scrip. containing wise maxims and practical truths suitable for the conduct of all classes of men (see PROVERBS, BOOK OF). PROVERBIAL, a. *prō-vér'bĭ-ăl* [F.—L.]: used or current as a proverb; mentioned in a proverb; pert. to or resembling a proverb. PROVER'BIALLY, ad. *-lĭ.* PROVER'BIALISM, n. *-ĭzm*, a proverbial phrase. PROVER'BIALIST, n. *-ĭst*, one who speaks, or writes, or collects proverbs.—SYN. of 'proverb': by-word; saying; saw; adage; aphorism; apothegm; axiom; maxim; truism; principle.

PROVERBS, *prov'érbz*: pithy, practical, popular, often homely, sayings, expressive of certain more or less general convictions. The definitions of the proverb are almost as numerous as its own varieties of form. Aristotle speaks of them as 'remnants, which, on account of their shortness and correctness, have been saved out of the wreck and ruins of ancient philosophy.' Agricola considers them 'short sentences, into which, as in rules, the ancients have compressed life.' Erasmus holds them to be 'well-known and well-used dicta, framed in a somewhat out-of-the-way form or fashion.' Cervantes explains them as 'short sentences drawn from long experience.' Johnson talks of them as 'short sentences frequently repeated by the people.' Less definitions of, than general opinions on the P., are sayings like that of Howell, that 'sense, shortness, and salt' form their component parts. They are 'the genius, wit, and spirit of a nation,' according to Bacon; 'The wisdom of many, and the wit of one,' according to Earl Russell. In them, it has been said, is an inexhaustible source of precious documents in regard to the interior history, the manners, the opinions, the beliefs, the customs of the people; and their use has been strikingly pointed out by George Herbert, who entitled his collection of P. *Jacula Prudentium* (Darts or Javelins of the Wise), a term derived probably from Plato's *Protagoras*.

Yet there have, on the other hand, not been wanting those who, like Lord Chesterfield, have deprecated their use in polite society, on account of their occasional vulgarity, and recommended stilted sentences à la Larochefoucauld instead. Of these solitary voices, however, no more notice was ever taken than they deserve. From the earliest historical times, P. have been household words, not merely among the people at large, but among the greatest and wisest of men. The prodigious amount of sound wisdom and good common sense that they

contain, the spirit of justice and kindliness that they breathe, their prudential rules for every stage and rank, their poetry, bold imagery and passion, their wit and satire, and a thousand other qualities, have, by universal consent, made them the most favorite mode of imparting hints, counsels, and warnings.

Being emphatically sayings originated within or commonly adopted by the people, and handed down, in most cases, from remotest antiquity, the question as to their origin and age is exceedingly difficult. Some of their sources have been pointed out in the responses of oracles, in the allegorical symbols of Pythagoras, in the verses of the ancient poets, in mythological tales, in historical events to which they allude. That they existed to a great extent before the times of which written records have reached us, is clear from the number of them which lie imbedded—a kind of well-known quotations—in these records themselves; and what tends to increase the difficulty of assigning them within a certain country or age, is the fact that the same P. are found among many nations and at all ages. From the East they were mostly imported into Hellas, thence to Rome, and thence they were scattered all over Europe, and partly brought back again, slightly altered, to the East. Even certain Jewish P. quoted by Christ and the apostles, which hitherto did not seem to offer any analogy in other languages, might be traced back to India, where they had existed for many centuries before they found their way into the popular speech of Palestine and Babylonia, and thence into the Talmud. The names of the authors of P. are usually lost; when known it is generally some memorable event in a celebrated man's life which is remembered in close connection with a certain striking sentence then uttered by him. In other cases the country of their origin may be pointed out by their reference to its scenery or its history; and even the special period which gave them birth may be recognized by some trace of its character, manners, fashions, and occupations. 'What is nearest and dearest to the heart of a nation, the aspect under which they contemplate life, how honor and dishonor are distributed among them, what is of good or of evil report in their eyes,' as a recent writer has it, will surely be apparent in their national proverbs. Thus, e.g., the Greek proverbs may be designated as fraught with a thorough knowledge of their own mythology, poetry, and history, bearing testimony to the high intellectual training of large classes. The Roman P.—fewer in number, as far as they are the genuine growth of their own soil—have much less poetry, and are deficient in the refinement and delicacy indigenous to Hellas. On the other hand, the character of the people comes well out in the constantly reiterated lessons of frugality, patience, perseverance, independence, which the P. inculcate; the practical hints as to marriage, education; and the various pursuits of that busy, vigorous, energetic nation—and among which agri-

culture was prominent. Of the P. now in use among European nations—estimated about 20,000—the Spaniards are supposed to have a very large, if not the largest proportion. They may be recognized by a certain *grandezza*, a stateliness and thoughtfulness, blended though they be with humor and irony; and by the spirit of chivalry, honor, and freedom with which they are filled. The Italian P., which come next as to quantity, are, to a certain extent, replete with a certain shrewdness and selfishness; and while fraught with unbridled passion, teach doctrines of cynicism and general distrust; yet, on the other hand, there are many of the noblest stamp, of delicate refinement of beauty, of subtle wisdom, teaching honor and honesty, plain-dealing and uprightness. In the same way, the French, the German, the English, as well as the Chinese and the Hindus, and every nation under the sun, impart a certain distinctive type and stamp to their homely sayings, which tells a distinct tale respecting their own inner life and national peculiarities. Of the Scotch proverbs, of which Kelly collected 3,000, it has been said that there is a shrewdness, though deficient in delicacy, about them; that they are 'idiomatic, facetious, and strike home.'

The P. are frequently used for ethical purposes in Scripture, which contains an entire book of them, ascribed, for the greater part, to the Wise King himself; in the Midrash and Talmud, which contains, likewise, a whole collection of pithy sayings of the 'Fathers,' or Mishnan teachers, and out of which several later collections have been compiled; in the patristic and later theological writers, who, like Luther, drew very largely on these popular treasures.

Erasmus lays claim to be the first modern collector of P., though Polydore Virgil, not without some truth, accuses him of plagiarism. His *Adagia* (Par. 1500) aroused the learned in Europe with desire to collect and to publish P., of their own countries. F. Nunez and the Marquis of Santellana edited Spanish *Refranos;* Florio, an Italian, *Giardino di Ricreatione* (1591); which was followed by the Italian collections of Angelus Monozini and Julius Varini. Ondin published French P., as *Curiosités Françaises.* The first real German (Nether-Saxon) collection is due to Johann Agricola, whose *Gemeine Sprikwoerde* appeared 1528. In England—Camden, Herbert, Howell, Fuller, Ray, Kelly, Bohn, and others; in Germany—Weber, Sailer, Nopitzsch, etc., have issued national collections. Freytag and Burkhardt published *Arabic Proverbs;* Dukes, a small collection of Neo-Hebrew P., etc. Thus, it may easily be seen, there is no lack of material; yet very little has been done toward investigation and elucidation of numerous points of interest connected with this subject. Disraeli's *Curiosities of Literature* contains a valuable essay on the 'Philosophy of Proverbs,' from which (as also from Eiselein's *Sprichwörter und Sinnreden,* 1840) Abp. Trench derived much information for his excellent little book, *On the Lessons*

in Proverbs. Freytag's introduction to his collection of *Arabic Proverbs*, and that of Le Roux de Lincy to his French collection, make honorable exceptions to the general run of vapid prefaces to most modern collections.

PROVERBS, THE BOOK OF (Heb. *Mishle;* LXX. *Paroimiai Salomontos;* Vulg. *Proverbia*): canonical book of the Old Test., containing an anthology of gnomes and sentences, the fruit of reflections on the Mosaic law and on the divine guidance of the people of the Israelites. It is called also the 'Book of Wisdom,' inasmuch as it embraces the doctrines of the old covenant crystallized into religious maxims of thought, will, and action. Practical piety is enjoined under the name of 'Life or Wisdom;' while 'Death,' or 'Folly' represents sin throughout. The form of these proverbs is manifold—similes, enigmas, theses, and antitheses, wise sayings, gnomes, comparisons, etc., vary constantly. The book is divided into three sections, to which the two last chapters form an appendix. The first section (i.—ix.) contains a description and a recommendation of Wisdom as the highest good obtainable, and is further subdivided into three portions. The second (x.—xxiv. 34) is equally in three portions, in the first of which the sentences are very loosely strung together; while, in the second, they are joined into more continuous utterances, sometimes running through several verses; and the third, which has the inscription: 'These, too, are of the wise men,' contains, again, some single sentences, principally in the form of commandments and prohibitions. The third section (xxv.—xxix.) is inscribed: 'These are also proverbs of Solomon, which the men of Hezekiah king of Judah copied out,' and is somewhat different from the former by the more predominant form of theses and antitheses, catch-words by which an association of ideas is produced, and similes. The first chapter appended (xxx.) contains the proverbs of Agur, which, in very artificial garb, teach the true wisdom and its practice in life; the second (xxxi.), inscribed: 'Words of King Lemuel, the prophecy that his mother taught him,' contains from verses 1–9 wise maxims for a king, and from 10–31, the praise and properties of a good wife, in the form of an alphabetical song.—Tradition has ascribed the authorship of this book to Solomon, 'the wisest of men;' but though neither the language, nor the structure, nor—as has principally been urged—the contents, are of a nature to convince us of the necessity of assuming various authors and various epochs, there is no doubt, a strong presumption in favor of the hypothesis of variety. Who the Agur was that is mentioned as the author of the last chapter but one, is not easily conjectured. Equally unsatisfactory are the results of the speculations about the reputed author of the last chapter, Lemuel, by some supposed to be the brother of Agur. Probably it is nothing more than a symbolical name. The last section (xxxi. 10–31)—an alphabetical

acrostic—probably belongs to B. C. 7th c., and by its language and form does not appear to have come from the author of the preceding part of the chapter. The nucleus of the book is formed by the second section. (x.—xxii. 16), to which the first (i.—ix.) was added as introduction, and the third as conclusion. Whether that first anthology (from the 3,000 proverbs of Solomon mentioned I Kings, iv. 32) was collected and redacted (into section two) during Solomon's lifetime, is very doubtful; so much, however, is certain, that the learned men at the time of Hezekiah undertook their additional collection with a view to a then already-existing portion. Jerome, misled by I Kings, iv. 32, erroneously states our Book of Proverbs to contain the 3,000 proverbs there ascribed to Solomon. The canonicity of the book is matter of controversy in the Talmud; there seems to have been at one time an objection to receive it among the number of sacred books, on account of certain contradictions in it; this objection, however, was overruled, and it occurs in the order of the Hagiographa (Kethubim) of the Masoretic Code, generally between Job and Ecclesiastes. The order followed in the Authorized Version had been adopted as early as the time of Jerome.—Principal writers on P. are Ewald, Bertheau, Hitzig, Elster, Rosenmüller, Hirzel, Umbreit, M. Stuart, and Dr. Noyes.

PROVIDE, v. *prō-vīd'* [L. *providēre*, to provide; *providens*, foreseeing, provident—from *pro*, before; *vidēō*, I see: It. *provvedere*, to furnish with]: to collect or get ready for future use; to prepare; to make a previous conditional stipulation; to take measures to counteract or escape an evil. PROVID'ING, imp. PROVID'ED, pp. PROVID'ER, n. *-ėr*, one who provides. PROVIDENCE, n. *prŏv'ĭ-dĕns* [F. *providence*—from L. *providen'tĭă*, foresight, providence]: foresight; timely care or preparation; the care and superintendence of God over His creatures and all things; a name applied to God; in *OE.*, prudence; frugality. PROV'IDENT, a. *-dĕnt*, careful in preparing for future wants; frugal; economical. PROV'IDENTLY, ad. *-lĭ*, with wise precaution. PROV'IDEN'TIAL, a. *-dĕn-shăl*, that may be referred to God's superintendence or direction; effected by the providence of God. PROV'IDEN'TIALLY, ad. *-lĭ*, in a providential manner. TO PROVIDE AGAINST, to take measures for counteracting or escaping any ill. TO PROVIDE FOR, to take care of beforehand. PROVIDED THAT, conj. on condition; upon these terms; this stipulation being made. —SYN. of 'provide': to furnish; supply; stipulate; foresee; procure; get; collect; afford; of 'provident': cautious; careful; prudent; frugal; economical; forecasting.

PROVIDENCE, *prŏv'i-dĕns:* city; port of entry; cap. of P. co., and one of the caps. of R. I.; at the head of navigation on the P. river, an arm of Narragansett Bay; on the New York and New England and the New York New Haven and Hartford railways; 30 m. n. by w. of Newport, 44 m. s.w. of Boston.

City and Harbor.—The city has an area of 16¼ sq. m. It is divided into two parts, known as the East Side and the West Side, by two small rivers which here unite; and the large area formerly called the 'Cove' has been filled in and is now devoted to railway purposes. The surface is very irregular, rising from a plain on the w. to a height of over 200 ft. above high-water on the e., and having a number of pretty hills and valleys. A considerable part of the present business section is on made ground. The high ground generally is adorned with costly residences. Business streets are paved and residence streets macadamized. The city has improved water and sewerage systems, cable and electric street railways, and gas and electric lighting plants.—The harbor is commodious and affords safe anchorage. The entrance to the bay is divided into two channels by Conanicut Island, and from Point Judith and Brenton's Point to P. the shore lines are irregular, and the bay is full of islands, making navigation without a pilot dangerous. The bay is defended by an earthwork on Dutch Island and by Fort Adams, a large granite structure that cost the Federal govt. $2,500,000, and was considered a strong fortification in its day, but would be useless in its present condition in modern warfare.

Notable Buildings.—P. contains many relics of historical interest. On the bank of the Seekonk river is 'What Cheer Rock,' where Roger Williams after his banishment from Mass., made his first landing and was cordially received by the Indians. Among the old buildings are the Friends' Meeting-house (erected 1727), state-house (1759), University Hall (1770), old market now occupied by the Board of Trade (1773), and the First Bapt. Church (1775). The modern buildings of note include the U. S. govt. building; City Hall (cost $1,050,000); Masonic Hall; Butler Exchange; Arcade; Public Library; Athenæum; Rhode Island Historical Soc., Court-house; cluster of buildings of Brown Univ.; Rom. Cath. Cathedral; St. Stephen's, All Saints, and St. John's Churches (Prot. Episc.); Union Congl. Church; First Universalist Church; Opera House; Narragansett (cost $1,000,000) and Dorrance hotels; Sayles Memorial Hall; Slater Hall.

Churches and Charities.—There are 119 churches, chapels, missions, and other places of religious service. Of the principal edifices 20 belong to the Bapt. Church, 16 to the Rom. Cath., 14 to the Meth. Episc., 13 to the Prot. Episc., 9 to the Congl., 4 to the Unit., and 3 each to the Presb. and Univ.—The charitable, reformatory and benevolent institutions include the Rhode Island Hospital (opened 1868), Butler Hospital for the Insane (opened 1847), Homœopathic Hospital, Dexter Asylum for the Poor (founded 1827), State Reform School, Home for Aged Women, State Prison, and Rom. Cath. Orphan Asylum.

Education.—The most noted educational institution in P. as well as in the state is Brown Univ. (q.v.), which in 1894 had 70 professors and instructors, 750 students, and 80,000 vols. in its libraries. Other institutions for higher instruction are La Salle Acad. (Rom. Cath., opened 1871), Acad. of the Sacred Heart (Rom. Cath.), English and Classical School (non-sect.), State Normal School (opened 1852), Rhode Island Hospital Training School for Nurses (opened 1882), Rhode Island Normal Training School for Kindergartners, Rhode Island State School for the Deaf (opened 1877), and the Friends' New England Boarding School (opened 1784).—In the public school year ending 1894, Apr. 30, there were in the city 26,309 children of school age, of whom 17,879 were enrolled in the public schools, 3,675 in parochial schools, and 765 in private schools. There were 74 public school buildings—59 primary, 10 grammar and primary, 3 grammar only, and 2 high; a manual training high school, 8 kindergarten schools, several disciplinary schools, schools for advanced work, and 18 evening schools. Including principals, there were 494 teachers, who received in salary $318,748. The expenditures of the year were $774,028, and the assessed valuation of public school property was $1,732,096.—There are 21 public libraries of 1,000 vols. and upward each. In 1895 P. had 34 newspapers and periodicals: 5 daily, 16 weekly, 1 semi-weekly, 2 bi-weekly, 9 monthly, and 1 bi-monthly.

Manufactures.—The following table shows the increase in the manufacturing industries by the census reports of 1880 and 1890, and the principal industries, in the order of value of products, reported 1890:

Principal industries.	Establishments.	Capital.	Hands employed.	Wages paid.	Cost of material.	Value of products.
		$		$	$	$
All industries 1890.....	1,934	61,133,598	42,124	20,793,399	39,794,241	77,467,283
All industries 1880.....	1,205	27,177,006	22,891	9,464,110	22,794,227	42,597,512
Increase...	729	33,956,592	19,233	11,329,289	17,000,014	34,869,771
Worsted goods	14	11,565,798	8,877	3,299,607	10,728,419	17,605,831
Foundry, machine shop products..	59	9,600,687	5,912	3,494,447	3,114,333	8,351,085
Jewelry.....	170	5,935,051	4,380	2,581,947	3,220,702	7,801,003
Cotton goods..	16	3,763,432	3,162	1,051,294	1,969,954	3,767,589
Silverware	4	3,002,232	1,034	780,935	1,045,860	2,509,869
Dyeing, finishing textiles	6	3,008,965	1,661	733,780	760,728	1,957,690
Carpentry.....	120	415,963	1,038	743,552	907,049	1,915,126
Slaughtering, meat packing.....	6	245,500	162	97,054	1,520,940	1,695,105
Gold and silver refining....	10	300,425	81	79,538	1,162,168	1,419,553

Commerce.—During the fiscal year 1893–4, the imports of merchandise aggregated in value $476,573; exports, $7,052; the entrances were 31 American and 77 foreign vessels of 17,556 aggregate tonnage, and the clearances, 12 American

and 66 foreign vessels of 11,166 total tonnage. In the calendar year 1894 the imports were $744,746, exports, $9,681.

Finances and Banking.—In 1894, Oct., the city had a bonded debt including a water debt of $6,935,691 of $13,593,250, and a floating debt of $2,369,884, and the sinking funds held $3,534,997, making the net debt $12,428,137. The assessed valuations were: Real, $126,463,800; personal, $40,800,400; total, $167,264,200; and the tax collected amounted to $2,676,227.—In 1895 there were 25 national banks (cap. $14,821,800), 4 state banks (cap. $914,450), 4 savings-banks (deposits $35,000,000), 4 deposit and trust companies (cap. $2,400,000), and 6 private banks.

History.—P. was settled by Roger Williams (q.v.) 1636, and named by him in gratitude 'to his supreme deliverer.' It originally comprised the whole co.; was organized under a local govt. 1640, received a royal patent 1643; was incorporated as a town 1649; and was partially burned in the King Philip Indian war 1675. The present city was incorporated by act of legislature 1831, taking effect 1832. Portions of the town of Cranston were re-annexed to the city 1868, 1873, and 1892, and portions of North P. 1767, 1873, and 1874. For upwards of 200 years P. was a noted seaport, with a large commerce reaching to Africa, China, India, and the West Indies, as well as the principal European ports; but its growth was very slow. Development was greatly retarded by the frequent cutting off of parts of its territory. From its original limits as the 'County of Providence Plantations,' Kent and Washington cos. were set off, and it also lost the territory taken for Cranston 1754, Glocester 1730-31, Johnston 1759, North P. 1765, Scituate 1730-31, and Smithfield 1730-31. The manufacture of cotton goods was begun here 1793, and of woolen goods soon afterward; and the success of these enterprises induced capitalists to gradually withdraw from commerce and engage in manufacturing, particularly after 1812. Under this influence the city entered on a period of rapid development, and during 1860-95 the population was more than trebled. Pop. (1880) 104,857, (1890) 132,146; (1895, Jan. 1) estimated, 155,000.

PROVINCE, n. *prov'ins* [F. *province*—from L. *provin'cĭă*, a territory beyond the borders of Italy acquired by the Romans: It. *provincia*]: a division of a kingdom of considerable extent; a district of a country, as distinguished from the capital; the proper office or business of any one; a region or tract. ECCLESIASTICAL PROVINCE, jurisdiction of an archbishop; this territorial division was adopted by the church from the state when the Roman empire became Christian under Constantine. In a province several dioceses are grouped under an abp., and it may comprise several states, a country, or more than one country. PROVINCIAL, a. *prō vĭn'shăl* [F.—L.]: relating to a province; local; not polished; rude or improper, as the pronunciation of a word, or as a dialect; pert. to the jurisdiction of an archbishop: N. a person living in the towns and dis-

tricts outside the capital of a country, as distinguished from an inhabitant of the capital; in *Rom. Cath. Chh.*, a monastic superior or governor: the *Provincial of an Order* is the superior of all the houses, and all the members of a monastic order, within any province. The office is generally held for a stated term of years, and in most orders the appointment to it rests with the General (q.v.). PROVIN'CIALLY, ad. *-lĭ.* PROVIN'CIALISM, n. *-ĭzm*, a word, phrase, or mode of speech peculiar to a district of country—see Note under DIALECT. PROVIN'CIALIST, n. *-ĭst*, one who lives in a province, or who speaks with the peculiar dialect and accent of the district. THE PROVINCES, all the country outside the capital.

PROV'INCETOWN: town in Barnstable co., Mass.; on the extreme end of Cape Cod and the Old Colony railroad, 55 m. by water and 120 m. by rail s.e. of Boston. It has one of the finest harbors in the United States, almost entirely landlocked, 3 by 5 m. in area, and on the inner side of the cape. The town contains 6 churches, high school, 22 district schools, public library, 3 hotels, a national bank (cap. $200,000), a savings-bank (deposits $500,000), a weekly newspaper, and (1894) assessed valuation $20,765, debt $85,371. The industries of P. comprise mackerel, cod, and whale fisheries, and ship-building, for which there are 3 marine railways. Historically, P. is noted as the place where the Pilgrim fathers first landed and made a temporary settlement, where they signed their compact of govt., where the first child of English parents was born in New England, and where Miles Standish started on his first campaign against the Indians. Pop. (1870) 3,865; (1880) 4,346; (1890) 4,642.

PROVINS, *prō-văng':* old town of France, dept. of Seine-et-Marne, 59 m. e.s.e. of Paris, in a valley irrigated by two streams, the Dartein and the Voulzie, whose waters are employed to turn 50 or 60 corn-mills in the district. It is surrounded by ancient walls, flanked by ruined watch-towers, and is divided into the high and low towns. In the former, is an ancient tower built during the middle ages, but commonly called *Tour de César.* The vicinity was long famous for roses, still cultivated to considerable extent. Pop. (1891) 7,888.

PROVISION, n. *prō-vĭzh'ŭn* [F. *provision*, provision, victuals—from L. *provīs'iōnem*, foresight, providence—from *pro*, before; *vidĕō*, I see: It. *provvisione*]: act of providing; care or measures taken beforehand; terms settled; care taken; food; the thing or things provided or collected: V. to supply with articles of food; to victual. PROVI'SIONING, imp. PROVI'SIONED, pp. *-ŭnd.* PROVI'SIONS, n. plu. *-ŭnz*, articles of food; victuals; in *eccles. hist.*, arbitrary interference by the pope in the right of private patronage: see PROVISOR. PROVISION in church law (see below). PROVI'SIONAL, a. *-ŭn-ăl*, provided merely for the occasion; temporary; selected or appointed in the meantime. PROVI'SIONALLY, ad. *-lĭ.* PROVISIONAL REGISTRATION, a preliminary and condi-

tional registration of a new public company at the proper government office. PROVISION-DEALER, a grocer or shopkeeper who retails articles of food of daily use.

PROVI'SION, in Church Law: bestowing an ecclesiastical benefice. It involves two stages—designation of the person on whom it is bestowed; and the actual collation (Lat. *collatio*) of the benefice, completed by his taking possession. Both these acts fall properly to the ecclesiastical authority; but by usage of very early date, the state and often individuals are admitted to a share in the P. In the mediæval church, the claim of the sovereign to the P. of vacant bishoprics was often the subject of contention with the popes (see INVESTITURE); but universally the right of final and complete P. was admitted to belong to the pope. In later times, this claim has commonly been regulated by concordat. In most Rom. Cath. countries, the crown elects to bishoprics, and the pope is bound to confirm the nominee of the crown, unless canonical cause of rejection appear. In the Russo-Greek Church, the candidates are presented by the Holy Synod, and the czar names the bp. from among them. In Prot. countries, the election to benefices and dignities in the Rom. Cath. Church is generally by the chapters; but in some of them, as in the Prussian kingdom and Holland, the crown has often exercised a veto. In the Church of England, the bp. is nominally elected by the chapter; but, in reality, the members of the chapter are permitted only to name the particular person whom the crown presents to them for election with the *congé d'élire*. In the Rom. Cath. Church in England and in Ireland, the parochial clergy, with the canons, recommend three candidates, one of whom is usually, though not necessarily, appointed by the pope; in the U. S. the bishops of a province present to the pope the names of 3 priests whom they deem fit to occupy a vacant see. For conditions and usages of P. to parochial and other benefices, see INSTITUTION. The completing act of P. is the installing in possession: see INDUCTION of Clergymen.

PROVI'SIONAL ORDER, in British Governmental Procedure: order granted under general powers conferred by act of parliament, by a department of the govt., by the secretary of state, or by some other authority, whereby certain things are authorized to be done, which could be accomplished otherwise only by an act of parliament. The order does not receive effect, however, until it has been confirmed by the legislature. Till that time, it is purely provisional; and even after it has been so confirmed, and is in reality an independent act, it keeps the same title. Provisional orders are very useful in facilitating the modification or extension of the provisions of general acts, to adapt them to the necessities of particular districts. They amount to a ready and inexpensive mode of obtaining local legislation.

PROVISO, n. *prō-vī′zō* [L. *provīsus*, foreseen or provided for—from *pro*, before; *vidĕō*, I see]: a conditional clause or stipulation in a deed or other legal writing, beginning with 'provided that'; a stipulation. PROVI′SORY, a. *-zĕr-i*, making temporary provision; conditional. PROVI′SORILY, ad. *-zĕr-i-li*. PROVISORIUM, n. *prō′vī-zōr′i-ŭm* [L. *provīsor*, a foreseer]: a special arrangement or stipulation, as, 'a provisorium of six months.'

PROVISOR, n. *prō-vī′zĕr* [see PROVISO]: in *eccles.*, one appointed by the pope to a benefice or church-living before the death of the incumbent, to the prejudice of the rightful patron; the steward or treasurer of a religious house; in *France*, the principal of a college.—The *Statute of Provisors*, 25 Edward III. st. 6, had for its object to end the abuses which had arisen in the exercise of the papal prerogatives as to disposal of benefices in England: see BISHOP: PATRONAGE: PROVISION, in Church Law.

PROVOCATION, PROVOCATIVE: see under PROVOKE.

PROVO CITY, *prō′vō*: city, cap. of Utah co., Utah; on the Provo river, and the Denver and Rio Grande and the Utah Central railroads; 48 m. s.s.e. of Salt Lake City. It is near the w. base of the Wahsatch Mountains and within three m. of Utah Lake. The region is very fertile, yields largely in wheat and grass, and is noted for its sheep ranches. The city contains several grist and saw mills, tanneries, woolen factories, a national bank (cap. $50,000), a savings-bank (cap. $50,000), 2 private banks, theatre, and 1 daily and 2 weekly newspapers. In 1894 it had an assessed valuation of $1,853,114, and 1895 a net debt of $125,180. Pop. (1880) 3,432; (1890) 5,153; (1894) est. 6,500.

PROVOKE, v. *prō-vōk′* [F. *provoquer*, to provoke—from L. *provocārĕ*, to call forth, to provoke—from *pro*, forth; *voco*, I call: It. *provocare*]: to call forth or bring into action; to excite or move to; to make angry; to irritate; to produce anger. PROVOK′ING, imp.: ADJ. causing irritation or inclination to quarrel. PROVOKED′, pp. *-vōkt′*. PROVOK′INGLY, ad. *-li*, in such a manner as to raise anger. PROVOK′ER, n. *-ĕr*, one who provokes; in *OE.*, a cause; a promoter. PROVOCATION, n. *prŏv′ō-kā′-shŭn* [F.—L]: anything that excites to anger or resentment; the act of exciting anger. PROVOCATIVE, a. *prō-vŏk′ă-tĭv*, tending to awaken or excite; stimulating: N. a stimulant; anything which revives or excites appetite. PROVOC′ATIVENESS, n. *-tĭv-nĕs*, the quality of being provocative or stimulating. PROVOKE′MENT, n. in *OE.*, provocation.—SYN. of 'provoke': to enrage; incense; excite; rouse; arouse; promote; cause; challenge; move; exasperate; stir up; awake; incite; anger.

PROVOOST, *prō'vōst*, SAMUEL, D. D.: 1742, Feb. 24—1815, Sep. 6; b. New York: first Prot. Episc. bp. of New York. He graduated at King's (now Columbia) College 1758; entered St. Peter's College, Cambridge, England, 1761; was ordained priest in the Church of England 1765; and became assistant minister of Trinity parish, New York, the same year. In 1774 he retired from his ministry for political reasons—being in favor of the colonies in the struggle then beginning, whereas his parish sympathized with the crown—and engaged in literary work. He declined invitations to become a delegate in the provincial congress, chaplain of the convention that framed the constitution of N. Y., a rectorship in Charleston, 1777, and the charge of King's Chapel, Boston, 1782. Two years afterward he was elected rector of Trinity Church, New York, 1785 chaplain of the continental congress; 1786 first Prot. Episc. bp. of New York; and 1789 chaplain of the U. S. senate. With Bp.-elect William White of Penn., he was consecrated in Lambeth Palace, London. In 1800 he resigned the rectorship and 1801 his episcopate, but he was continued in the latter with the aid of a coadjutor till his death.

PROVOST, n. *prō'vōst* [AS. *prǽfost*, a president: F. *prévôt*: OF. *provost*, a provost—from L. *praepositus*, a president, a chief—from *prae*, before; *positus*, placed; *ponĕre*, to place]: the object of a laudatory or depreciatory, as the principal of a college (see PROVOST, in Church Law): in *Scot.*, the chief magistrate of a city or town corresponding to mayor): the chief magistrates of Edinburgh, Glasgow, and now of Aberdeen and Perth, are styled Lord Provost; the temporary prison in which military police confine prisoners till otherwise disposed of. PROV'OSTSHIP, n. the office of a provost. PROVOST, or PROVOST-MARSHAL, often pronounced *prō vō'*, in *mil.* or *nav.*, an officer whose duties are, to prosecute crimes and offenses against military discipline, to punish offenders, to take charge of prisoners, and to superintend the execution of punishments.

PROVOST, *prō'vōst*, in Church Law: chief dignitary of a cathedral or collegiate church, whence the title has been transferred to heads of similar bodies, religious, literary, or administrative. Properly, however, the name is given to the highest dignitary in the metropolitan or diocesan chapter, and is often held conjointly with the archdeaconry. The P. is next in dignity after the abp. or bp., a position which is the right also of the P. of a collegiate chapter. The name is given also to the superiors of certain religious houses of minor rank, whose relation to more important houses is analogous to that of the priory to the abbey. It was given also to certain lay officials like the modern church-warden. In the Prot. Church in Germany, the name P. is sometimes synonymous with that of dean or arch-priest; and occasionally, where several minor churches or chapels

are attached to one chief church, the minister of the latter is called 'provost.'

In England, the heads of several colleges in the University of Oxford, and the head of King's College, Cambridge, are designated provost. The head of Eton College also is so called.

PROVOST-MARSHAL. *prō'ōst mär'shal:* in general an officer of the army or navy appointed to superintend the execution of martial law, carry out the sentence of a court-martial, have charge of persons arrested under martial law, and preserve order in localities placed under military control. His powers are similar to those of a chief of police in a city or a sheriff in a co.; and in addition he has summary authority derived from the articles of war, the mutiny acts, or the regulations of the army and navy of his country, by which he can punish an offender, taken *flagrante delicto*, on the spot. See MARTIAL LAW.

PROW, n. *prow* [F. *proue;* Sp. *proa*, the prow of a ship—from L. and Gr. *prōră*, the fore part of a ship]: the fore part of a ship—the hinder or opposite part being called the *poop* or *stern;* the beak or pointed part of a galley or a xebec.

PROW, a. *prow* [F. *preux;* OF. *pros*, gallant: It. *pro*, brave (see also PROWESS)]: in *OE.*, valiant. PROWEST, superl. *prow'ĕst*, in *OE.*, most valiant.

PROWESS, n. *prow'ĕs* [F. *prouesse;* It. *prodezza*, prowess, valor—from L. *prodessĕ*, to be of use, to do good; also referred to mid. L. *prudens*, brave]: valor or bravery, particularly in a soldier.

PROWL, n. *prowl* [F. *proie*, prey; *aller*, to go—as if a supposed OF. term, *proieler;* also said to be connected with *prog*, which see]: a ramble in a stealthy manner, as one seeking prey or plunder: V. to rove or wander stealthily, as one seeking prey or plunder; in *OE.*, to prey, to plunder. PROWL'ING, imp.: ADJ. roving in a stealthy manner, as for prey. PROWLED, pp. *prowld.* PROWL'ER, n. *-ėr*, one who prowls. PROWL'INGLY, ad. *-lĭ.*

PROXIMAL, a. *prŏks'ĭ-măl* [L. *proximus*, next]: toward or nearest; the part of a limb nearest to the trunk, or the part of a fixed organism nearest to its point of attachment; the opposite of *distal.*

PROXIMATE, a. *prŏks'ĭ-māt* [L. *proxim'ĭtas*, nearness—from *proximus*, nearest]: nearest; closest; immediate. PROX'IMATELY, ad. *-lĭ.* PROXIMITY, n. *prŏks-ĭm'ĭ-tĭ*, state of being next; immediate nearness. PROXIMATE CAUSE, that which immediately precedes and produces the effect; opposed to *remote* or *mediate.* PROXIMATE PRINCIPLES, in *chem.*, distinct compounds which exist ready formed in animals, as albumen, fat, etc., and in vegetables, as sugar, starch, etc.; in *analysis*, bodies themselves complex into which a more complex body can be split up.—SYN. of 'proximate': nearest; next; closest; direct; immediate.

PROXIMO: see under CURT. 2.

PROXY, n. *prŏks'i*, PROXIES, n. plu. *prŏks'iz* [contraction from *procuracy*—from L. *procurātor*, one who takes care of, a manager for another: Dut. *prokuratie*, an authority or warrant of attorney]: person who is substituted to act for another: the agency of a substitute: the writing by which one person is authorized to vote for another: V. to vote or act by the agency of another. PROX'YING, imp. PROXIED, pp. *prŏks'id*.

PRUDE, n. *prōd* [F. *prude*, wise, discreet; *prude*, a prude: L. *prudens*, knowing, wise]: a name ironically given to a woman who sets up for preciseness of conduct; a woman affecting great reserve, coyness, and excessive virtue. PRUDERY, n. *prōd'ĕr-ĭ*, behavior or manners of a prude; excessive nicety in conduct. PRUD'ISH, a. *-ĭsh*, of or like a prude; very formal, precise, or reserved. PRUD'ISHLY, ad. *-lĭ*.

PRUDENT, a. *prōd'ĕnt* [F. *prudent*, prudent—from L. *prūdens* or *prūdentem*, discreet, prudent: It. *prudente*]: careful of the consequences of measures or actions; correct and decorous in manner; cautious; wary; judicious. PRU'DENTLY, ad. *-lĭ*, discreetly; judiciously. PRU'DENCE, n. *-dĕns* [F.—L.]: the habit of acting with deliberation and discretion; wisdom applied to practice; carefulness. PRUDEN'TIAL, a. *-dĕn'shăl*, proceeding from or dictated by prudence. PRUDEN'TIALLY, ad. *-shăl-lĭ*. PRUDEN'TIALS, n. *-shălz*, maxims of prudence or practical wisdom.—SYN. of 'prudence': discretion; caution; circumspection; wisdom; foresight; providence; circumspectness; judiciousness; judgment; forethought;—of 'prudent': wise; cautious; politic; circumspect; wary; provident; economical; discreet; considerate.

PRUDENTIUS, *prū-dĕn'shi-ŭs*, AURELIUS CLEMENS: first of the early Christian verse-makers: b. Spain 348. Nothing is known regarding him except what he has himself told in a poetical autobiography prefixed to his works. From this we learn that he received a liberal education, was admitted to the Roman bar, practiced as a pleader, discharged the functions of civil and criminal judge, and was ultimately appointed to a high office at the imperial court. The year of his death is not known. In his youth, P. was fond of pleasure, and very dissipated; but as he grew old, he became very devout, and his writings (all in Latin verse) reflect the latter phase of his character. The most graphic and vigorous of these is *Peristephanon Liber*, 14 poems in various meter, in honor of certain saints who had suffered martyrdom.

PRUD'HOMME, n. *prōd-ŏm'* [F. *prud'homme*, a skillful person—from *prude*, grave, sober; *homme*, a man—from L. *homo prūdens*, a wise man]: a prudent or discreet man.

PRUD'HOMMES', COUNCIL OF: municipal tribunal of reference and arbitration, composed of citizens, in the middle ages at Marseille, Lyon, and perhaps elsewhere in France, whose function was to decide disputes between masters and workmen. Similar tribunals, under the same name, were reintroduced by Napoleon I. 1806, and have been of great practical utility. They now exist—or recently existed—in Lyon and Paris. The council in Lyon, pertaining to the silk-trade and trades immediately connected with it, consists of manufacturers, mercers, master-workmen, foremen, dyers, and common workmen elected among themselves. It is empowered to dispose finally of all differences between manufacturers and their workmen, or between master-workmen, companions, and apprentices, where the sum in dispute does not exceed 200 francs; and it may take cognizance, also of cases involving whatever amount, subject to an appeal to the Tribunal of Commerce or Tribunal of First Instance. Miscellaneous functions also belong to the council including the inspection of the workshops, in order to obtain information regarding the number of looms and of workmen, and to give opinion, when required by the administrative authorities, on any question submitted to it. In 1844, a Council of Prud'hommes was established in Paris, pertaining to the metal trade, and all trades connected with it; and three others were instituted in Paris 1847—one connected with the manufacture of tissues of all kinds, another with the manufacture of chemicals, and a third having jurisdiction in all other trades.

PRUINOSE, a. *prōō-nōz* [L. *prūinōsus*, full of hoar-frost—from *prūina*, hoar-frost]: in *bot.*, covered with glittering particles, as if fine dew had been congealed upon it; like hoar-frost.

PRUNE, v. *prôn* [Icel. *þrjon*; Scot. *preen* or *prin*, a pin or knitting-needle—from the notion of arranging nicely with a pointed implement: Dut. *priem*, a pin or bodkin]: to dress or trim, as trees or shrubs, to improve their growth; to divest of anything superfluous. PRUN'ING, imp.: N. the dressing of trees and shrubs by lopping off their superfluous branches. PRUNED, pp. *prônd*. PRUN'ER, n. *-ėr*, he or that which prunes. PRUNING-HOOK, -KNIFE, or -SHEARS, tools used for lopping or dressing plants or trees.

PRUNE, n. *prôn* [F. *prune*: It. *prugna*, a plum—from L. *prūnum*, a plum: Gr. *proumnon*]: a dried plum. PRUNIFEROUS, a *prôn-ĭf'ėr-ŭs* [L. *fero*, I carry or produce]: plum-bearing.—A *prune* is a dried plum, used principally for cooking. Large quantities are produced in France, Spain, Germany, and other countries of Europe, and in California. Special varieties of the plum are grown for the purpose. For the finer grades, the fruit is picked by hand, when free from dew or rain, and thinly spread in a dry and cool place where free circulation of air can be secured. When mellow, the plums are exposed to

artificial heat, for about 24 hours, and are then allowed to cool. Alternate heating and cooling is continued till the fruit is perfectly dried. It is then packed into cases or jars for market. The common fruit is shaken from the trees and is hastily dried. The Brignolles P. of France is peeled before being dried, and the stone is removed before the fruit is offered for sale. In Cal. with the exception of a narrow tract near the coast, drying is done largely in the open air. The climate is remarkably favorable both to production, and to curing of the fruit. Where the air is too moist to admit of drying without artificial heat, large quantities of fruit are sent to the less humid regions of the interior to be cured. The varieties of the plum best adapted to drying are readily grown in a considerable portion of the state; in the valleys and foot-hills, as well as near the coast; but Santa Clara co. produces about two-thirds of the total yield. The Cal. P. is much superior to the average foreign product, which to a considerable extent it has supplanted in our markets, and it commands about two cents more per pound. The area given to P. culture is being rapidly increased, and sanguine growers predict that in a few years Cal. will not only supply the home market but will also send large quantities of this fruit to foreign lands. The product (1890) was about 18,000,000 lbs.

PRUNEL'LA, properly BRUNELLA: genus of plants of nat. order *Labiatæ*, having the upper lip of the calyx 3-toothed, the lower lip 4-cleft; the upper lip of the corolla arched and nearly entire; the lower lip 3-lobed; and four filaments, each with two teeth at the extremity, of which one bears the anther. One species, *P. vulgaris*, popularly known as SELF-HEAL, is frequent throughout most parts of Europe, central Asia, N. America, and New Holland. It has oblong-ovate stalked leaves, and violet-blue flowers, or flesh-colored, rarely white, very densely whorled, forming an imbricated oblong spike. It was at one time in considerable repute as a febrifuge. It is mildly aromatic and slightly astringent. Several beautiful species of Brunella are cultivated for ornament.

PRUNELLA, n. *prō-nĕl'lă*, or PRUNEL'LO, n. *-lō* [F. *prunelle*, cloth made of wool dyed, from its color resembling that of *prunes*]: a smooth, strong woolen stuff, usually black.

PRUNING: removal of branches from fruit or forest trees to secure greater production of fruit, improvement of the timber, or finer form. In pruning for ornamental purposes, taste must be consulted, but reference must be made also to the nature or habit of the tree itself. Some trees will bear clipping into fantastic forms, which would be utterly destructive of others. Such forms, formerly esteemed as the finest ornaments of a pleasure-ground, or the neighborhood of a mansion, are rejected by the simpler taste of the present day. Much may be done, however, by removal of branches, to give finer form to ornamental trees; but in this, as in the P. of trees grown

for the sake of their timber, a great mistake is often made in allowing branches to grow to considerable size before they are cut off. It may be accepted as a general rule that the branches removed should be small in proportion to the whole bulk of the tree. The removal of twigs and small branches is attended by no bad effects, and may be beneficial; but the removal of large branches is injurious, and the leaving of stumps or snags aggravates the evil and frequently spoils the tree. But with forest trees, P. may be in great part avoided by taking care to plant at proper distances, and thinning out the plantations sufficiently in early periods of their growth. In this way, better timber is obtained, and a greater product from the land. Pines and firs scarcely ever require P., except in the removal of those lower branches which have actually begun to wither or decay. In other trees, it is important to watch for branches that would divide the trunk, and, by removing one, prevent the division, and thus cause the main stem to ascend higher before it forms a crown, but this must be done while the branches are still very young. Plantations should be examined with a view to P. at intervals of not more than a year, after they are three to six years old.

Fruit trees, vines, and plants require P. to keep them in proper form and for production of a large quantity and fine quality of fruit. If too many branches are allowed to grow, the roots cannot obtain sufficient nourishment to maintain them and also produce fruit. P., diminishing the number of channels for the sap, promotes fruitfulness. Prevention of the growth of branches by pinching back the ends in summer secures the same result with much less injury to the tree, as no serious wounds are made and the proper balance between the top and root growth is more perfectly maintained. Except with the most hardy trees and vines P. should not be done in extremely cold weather. Wounds heal readily in summer, but removal of branches at this time seriously checks the growth, and sometimes impairs the vitality, of the tree. Early spring is the most favorable time for extensive P., but pinching back must be done in the period of growth; and slight P. is then admissible. In P., reference must be had to the special characteristics and habits of growth of the tree or vine. The cherry requires but slight P., the peach and grape need much more thorough treatment, and the apple and pear are benefited by the removal of only a moderate quantity of wood. For more specific directions concerning P. of different classes of fruit trees, vines, and plants, see their special titles. Among the instruments used in P. are various forms of knives, saws, and shears. They should be kept sharp, so as to make a smooth cut, but as far as possible pinching back the twigs and rubbing out superfluous buds should make their use unnecessary.

PRU'NUS: see PLUM.

PRU'NUS VIRGINIA'NA: see CHOKE-CHERRY.

PRURIENT, a. *prŏ'rĭ-ĕnt* [L. *pruriens* or *prurien'tem*, itching or longing for; *prurīrĕ*, to itch: It. *prurire*, to itch]: itching; uneasy with desire. PRU'RIENTLY, ad. *-lĭ*. PRU'RIENCE, n. *-ĕns*, or PRU'RIENCY, n. *-ĕn-sĭ*, an itching; a longing desire or appetite for anything.

PRURIGO, n. *prô-rī'gō* [L. *prurīgo*, an itching: It. *prurigine*]: an eruptive disease of the skin, accompanied by much itching. PRURIG'INOUS, a. *-rĭj'ĭ-nŭs*, tending to prurigo; itching.—*Prurigo* is a non-contagious affection of the skin, in which intense itching is the prominent symptom. Sometimes the parts affected present no marked deviation from the normal type, but usually they are covered with papulæ, nearly of the same color as the skin. Hence P. has been placed among the papular diseases of the skin. William makes three varieties of this disorder—viz., *P. mitis*, *P. formicans*, and *P. senilis*. This affection seldom affects the whole surface; its favorite seats being the neck, the shoulders, the back, the outer surface of the limbs, the anus, etc. In *P. formicans* there is not only intense itching, but patients complain of a feeling like the creeping of ants (hence the specific name) or the stinging of insects, or as if hot needles were thrust into the skin. All forms of this disease are aggravated by exposure to the air, and by heat; and the sensations are often so distressing after the patient has become warm in bed, as to prevent sleep for many hours. *P. senilis*, occurring, as its name implies, in old persons, is characterized by extreme severity and permanence of itching, and by obstinacy under every kind of treatment. The varieties of this disorder may probably be often traced either to disease of the digestive system, or to lack of personal cleanliness; but in most cases their origin is obscure.

In treatment of this disease, attention should be given to the diet. All stimulating condiments and drinks should be avoided, and only a plain, easily digested food allowed. Internal remedies are seldom of use except opium, which in severe cases is required in free or large doses, in order to procure rest. The local applications recommended are very numerous. Lotions of spirit, diluted vinegar, solution of acetate of ammonia, glycerine, prussic acid, etc., and ointments containing creasote, iodide of sulphur, aconitine, etc., have been advocated by various physicians of eminence. Unless, however, great attention is given to personal cleanliness, no remedy is likely to be of benefit.

PRU'SA, or PRU'SIAS: see BROUSSA.

PRUSSIA, *prŭsh'ya* or *pró'shĭ-a* (Ger. *Preussen*): kingdom embracing nearly the whole of northern Germany; bounded n. by the German Ocean, Jutland, and the Baltic; e. by Russia and Poland; s. by Austria, Saxony, Saxe-Altenburg, Saxe-Weimar, Gotha, and other small German states, Bavaria, Hesse-Darmstadt, and Alsace-Lorraine; w. by Belgium and the Netherlands. P. owns, besides, the detached domains of Hohenzollern (q.v.) and Jade or Jahde on the North Sea.

Area and pop. (1890) of the 14 Prussian provinces:

	Sq. m.	Pop. 1880.	Pop. 1890.
East Prussia	14,280	1,933,936	1,958,663
West Prussia	9,852	1,405,898	1,433,681
Berlin	24	1,574,485	1,578,794
Brandenburg	15,381	3,389,155	2,541,783
Pomerania	11,626	1,540,034	1,520,889
Posen	11,182	1,703,397	1,751,642
Silesia	15,562	4,007,925	4,224,458
Saxony	9,748	2,312,007	2,580,010
Schleswig-Holstein	7,298	1,127,149	1,217,437
Heligoland	0.23	.....	2,086
Hanover	14,855	2,120,168	2,278,361
Westphalia	7,801	2,043,442	2,428,661
Hesse-Nassau	6,059	1,554,376	1,664,426
Rhenish Prussia	10,422	4,074,000	4,710,391
Hohenzollern	441	66,624	66,085
Total	134,531	27,279,111	29,957,367

The duchy of Lauenburg, 452 sq. m., pop. (1875) 48,808, was incorporated with the province of Schleswig-Holstein 1876, July, and is included in the estimate above.

The total pop. of P. (1819) was 10,981,934; (1858) 17,739,913; (1867)—area increased from 107,757 English sq. m. to its present size—pop. 24,106,847; (1871, Dec.) 24,689,252; (1880) 27,279,111. The census 1890 showed the following cities and towns with more than 100,000 pop. each. Berlin 1,578,794; Breslau 335,186; Cologne 281,681; Magdeburg 202,234; Frankfurt-on-the Main 179,985; Hanover 163,593; Königsberg 161,666; Düsseldorf 144,642; Altona 143,249; Elberfeld 125,899; Danzig 120,338; Stettin 116,228; Barmen 116,114; Krefeld 105,376; Aix la Chapelle 103,470; and Halle-on-Saale 101,401.

Physical Character, etc.—The larger portion of P. is part of the great plain stretching from Holland to the Ural Mountains, and, except in the s. of Hanover and Silesia, is an almost unbroken level. The Sudetic Mountains, whose n. ranges, known as the Riesengebirge (q.v.), lie between the Oder and the Elbe, divide P. from Bohemia; while the Thüringerwald intersects the line dividing it from Saxony and some minor German states. The Harz Mountains (q.v.) of Hanover are now within Prussian territory. None of these ranges rise in their highest summits above 5,000 ft. In the e. the surface of the great plain of P. is marked by two distinct tracts of more elevated land, one of which belongs to the elevation which, running generally parallel to the Baltic, may be traced from the mouth of the Elbe to the source of the Volga, and which in P. rises about 400 ft. above sea-level. This tract is diversified with numerous lakes, none more than 20 sq. m. in extent, but which altogether occupy more than 300 sq. m. The soil,

chiefly loose sand interspersed with a large number of erratic blocks of granite, is sterile, covered in many places with heaths and belts of stunted pines. On the n. slope, terminating on the shores of the Baltic, are several fertile districts, especially along rivers which have been carefully embanked, as the Niemen and the Vistula. The s. elevation of the Prussian plain, between the Polish mountains of Sandomir in the s.e., and the Elbe between Magdeburg and Barg in the n.w., attains a height of about 1,000 ft. near Breslau, on the Oder, where it is known as the Trebnitz Heights. Its general character is more fertile than the n. elevation; while the country between the two is nearly all extremely sterile. It includes the sandy waste in which Berlin, the capital, is situated. S. of this tract, and in Silesia and Prussian Saxony, the country is fertile, including some of the most productive grain-growing districts of Prussia. Hanover has much the same character. Great marshes or peat-moors cover the n. and n.w. districts; but the valleys among the Harz Mountains in the s. are often fertile, and adapted for agriculture. The coasts are low, and require to be protected from the overflow of the sea by embankments and dikes. Schleswig-Holstein, the recently annexed territory n. of the Elbe, is in part sandy and heathy, like the plain of Hanover, but it has also numerous marshes. The great plain of northern P. is watered by five large rivers—the Weser, Elbe, Oder, Vistula, and Niemen; the numerous affluents of which, with many smaller streams, contribute largely to facilities of intercourse throughout the country, as many of them are navigable for vessels of several hundred tons.

The w. and s.w. parts of P., comprising Rhenish Prussia, Westphalia, and Hesse-Nassau, are quite distinct in their physical character from the rest of Prussia. They are divided by the Rhine into two portions, each having an elevated and a low plain. On the w. bank of the river, the level land terminates in the n. extremity of the Vosges, or, as they are here called, the Hardt Mountains, and extends n. as far as Aix-la-Chapelle. This table-land is broken along the bank of the Moselle by ranges of the Hochwald and the Soonwald, whose highest summit, Walderbeskopf, rises about 2,700 ft. The plain n. of the Moselle, known as the Eifel and the Hohe Veen, has a mean elevation of 1,600 ft., with a few higher hills. The level country between the Rhine and Maas, bordering the Eifel, is extremely fertile. On the e. side of the Rhine, the table-land, rising along the banks of that river and the Main, terminates in the ridge of the Taunus, whose highest summit, the Feldberg, is above 2,800 ft. In the n., the plain ends in the Westerwald between the Lahn and the Sieg, and in the Sauerland between the Sieg and the Ruhr. The Teutoburgerwald and the Harz Mountains cut off this region from the sandy and heathy wastes of n. Prussia. The soil is generally poor in these districts, which, however, possess special sources of wealth in iron and coal mines.

But Hesse-Cassel, which forms part of the central plateau of Germany, is particularly fruitful, cereals of all kinds growing abundantly.

The narrow valley of the Rhine is noted as one of the most picturesque and beautiful parts of Germany. The Rhine (q.v.) is navigable through its entire course in P., which it traverses from s. to n., receiving numerous other rivers—as the Lahn, Wied, Sieg, Wupper, Ruhr, Lippe, Berkel, and Vechte on the right; and on the left the Ahr and the Moselle, the latter navigable more than 150 m. within the Prussian dominions. The Weser, the Elbe, the Oder, and the Vistula, as also the Spree and the Havel, affluents of the Elbe, are of high importance for inland navigation (see these titles). The great rivers of n. Germany are connected by an extensive system of canals, e.g., the Seckenburger, the Friedrichsgraben, the Finow, Bromberger, and Friedrich-Wilhelms, and the Plauensche.

Climate, Products, etc.—The climate presents great differences in the e. and w. provinces—the eastern being exposed to heavy snow-storms in winter, and great drought in summer; and with mean annual temperature 43°, have summer mean temperature 61°, and winter 26° F.; while the western, which have milder winters, and larger fall of rain, have mean annual temperature 49°·5—summer 63°, and winter 35° F.

Agriculture and rearing of cattle are principal sources of employment and wealth of the rural population of the entire monarchy, and the state has hitherto directed unremitting attention to their furtherance and improvement; abrogating onerous land-taxes, advancing money to landowners, encouraging agricultural institutions, introducing approved breeds of animals and improved farm instruments, etc. About one-half, or 12,300,000, of the people are engaged in agriculture as sole or chief occupation. Large estates, as a rule, are found only in the e. and least populated provinces of the monarchy. A survey 1858 showed 1,099,000 landowners, possessing each less than 5 morgen, or 3½ acres. Wheat, rye, oats, barley, peas, millet, rape-seed, maize, linseed, tobacco, flax, hemp, hops, chicory, are extensively cultivated and exported. The finest grain districts are the Börde, near Magdeburg, the low lands on the Wartha and Netze, and on the Plöne and Madüe lakes, n.e. Pomerania, the island of Rügen, the valleys of the Oder in Silesia, of the Saale, Moselle, Saar, and parts of Hesse-Nassau. The potato culture is extensive. Western P. is noted for excellent fruits and vegetables, and its provinces are pre-eminent for their wines—Nassau specially for its Rhine wines, Hochheimer, Johannisberg, Rüdesheimer, and Asmannshäuser. The forest lands, chiefly in East P., Posen, Upper Silesia, Westphalia, s. Hanover, and Hesse-Nassau, are of great value, and occupy 10,000,000 English acres. The mineral products of P. include coal, iron, lead, zinc, copper, cobalt, antimony, manganese, arsenic, sulphur, alum, nickel, black-lead, baryta, gyp-

sum, slate, lime, free-stone, salt, amber, agate, jasper, onyx, etc. All metals, salt, precious stones, and amber belong to the crown. The latter substance is found almost exclusively along the Prussian coast from Danzig to Memel, where it is fished, dredged for, or dug up near the shore. P. has more than 100 mineral springs, of which the most noted and efficient are the sulphur baths of Aix-la-Chapelle and Ems, the iron springs of Schwalbach, Wilhelmsbad, Driburg, and the hot and saline baths of Reinerz, Landeck, Flinsberg, Freienwalde, Langenschwalbach, Wiesbaden, Schlangenbad, and Selters.

East P. is noted for its royal studs, and the excellent breed of horses which it now raises, and of which large numbers are annually exported. Westphalia has special repute for excellence of its hams and pork, Pomerania for its smoked geese, and Brandenburg and Hanover for honey and wax.

Fish of all sorts abound in the rivers and numerous lakes; seals are taken in the Baltic. The wooded districts abound in game of every kind; pheasants, partridges, and wild geese being often found in enormous quantities. Besides stags, fallow-deer, wild boars, foxes, otters, weasels, polecats, martens, badgers, hares, and rabbits, the lynx, bear, eagle, and beaver are occasionally seen.

Manufactures, Commerce.—The principal manufactures are linens, for which certain districts of Silesia, Prussian Saxony, and Brandenburg have a European celebrity; while of late years cotton manufacture by steam has been largely developed in rivalry with the older linens worked by hand-looms. Besides these, there are numerous manufactories of silk, wool, mixed cotton and linen fabrics; including fine shawls and carpets in Brandenburg, stockings and ribbons in the Rhenish provinces, where, as well as in Westphalia and Hesse-Nassau, the flax, hemp, and silk and cotton thread are mainly prepared for the manufacturers. These districts, moreover, are foremost in preparation and manufacture of iron, steel (the steel and gun works of Krupp, at Essen, being world-famous), and other metallic wares, paper, leather, soap, oil, cigars, and tobacco, and for the number of distilleries and breweries; while Saxony and Silesia have the largest number of chicory, starch, beet-root, gunpowder, and glass works. Berlin and Elberfeld rank as the two most important centres of manufacture on the continent. P. yields annually about one half of the world's product of zinc, and over 90 per cent. of all the coal mined in Germany. Coal is most abundant in Silesia, Westphalia, and the Rhine province; lignite principally in Saxony; and iron in Silesia, Westphalia, Hanover, Hesse, Nassau, and the Rhine province. The principal productions 1893 were: Coal, 67,657,844 metric tons, value $101,277,412; lignite, 17,553,419, value $10,222,228; iron ore, 4,007,900, value $5,553,641; and pig iron, 3,539,702, value $37,829,260. The total mineral products 1892 aggregated in value $141,229,717.

The commerce of P. is materially facilitated by her

central European position and her network of rivers and canals, especially the great Baltic canal from Kiel to Brunsbuttle on the Elbe, opened in June, 1895, having cost over $37,000 000, which make her territories the connecting medium between several of the great European states, and which, with 16,000 m. of railway, 22,000 m. of public roads, and a sea-line of 700 m. on the Baltic and 200 on the German Ocean, gives her a free outlet to the rest of the world. The Prussian mercantile marine, 1893, numbered 2,132 vessels, of 328,771 tons. The chief ports are Memel, Pillau, Königsberg, Danzig, Colberg, Swinemünde, Stettin, Wolgast, Stralsund, Kiel, Flensborg, Altona, Harburg, Geestemünde, Leer, and Emden. The principal commercial towns are Berlin, Königsberg, Breslau, Barmen, Elberfeld, Danzig, Stettin, Cologne, Magdeburg, Aix-la-Chapelle, and Frankfurt-on-the-Main.

The money, measures, and weights of P. are those in use throughout the German empire. In accordance with the law of 1872, the *mark* is the unit of reckoning, and has gradually displaced Thalers (q.v.) and silbergroschen. The Prussian or Berlin Bank, founded 1765, with numerous branches in the provinces, is the most important of the banks which possess the right of issuing notes.

Religion.—The dominant religion is Protestantism; and since 1817, the Lutheran and Reformed churches have been united under the head of one common evangelical church. Everything connected with the external administration of church matters is under control of the minister of public instruction and ecclesiastical affairs, but every religious community manages its own internal concerns; the Prot. churches acting in conjunction with consistories or boards appointed by the govt., one of which exists in each province, under the direction of the upper president, or provincial gov., and clerical supt. generals, who in Posen and Pomerania bear the title of bishop; while the Rom. Cath. Church is directed by the two abps. of Posen and Gnesen, and Cologne, under whom stand the four bishopries of Kulm, Münster, Paderborn, and Treves. The two episcopal sees of Breslau and Ermeland are directly under the jurisdiction of the pope; while the dist. of Glatz, in Silesia, belongs to the archbishopric of Prague, and Katscher, in Upper Silesia, to that of Olmütz. The census of 1890 showed the numbers of the religious bodies in P. as follows: Protestants 19,230,376; Rom. Catholics 10,252,807; other Christians 95,349; Jews 372,058; and other religions 4,691. The Protestants were in the predominance in the new provinces annexed 1867. The higher Rom. Cath. clergy are paid by the state. A controversy between the P. diet and the Vatican assumed a serious form 1870, which was intensified by the passage of the Falk or May laws, under which about two-thirds of the bishopries in P. became vacant. Important mutual concessions were made 1883, and the diet ended the contest 1891 by restoring the salaries of the suspended bishops.

Education.—Education is compulsory in P., and its management and direction are under the control of the state. In no country are better or ampler means supplied for the diffusion of knowledge among all classes. The entire educational department is under the control of the minister of public instruction and ecclesiastical affairs, with local supervising authorities in each province. All of the universities, high schools, and normal schools, and some of the gymnasia, real gymnasia, and other similar schools, are supported and administered by the general govt.; and all other schools are maintained by the local communities under the direction of the govt. A review 1895 of the educational statistics of P. showed: Universities (1892–3), 11, with 1,321 instructors and 12,670 students; gymnasia and progymnasia, 316, with 5,454 instructors and 89,050 students; realgymnasia, realprogymnasia, and higher realschulen, 184, with 2,666 instructors and 44,958 students; realschulen, 55, with 1,015 instructors and 23,077 students; public elementary schools (1891) 34,742, with 56,197 instructors and 4,916,476 pupils; and public normal schools (1892), 122, with 893 instructors and 10,836 students. There were also 3 technical high schools, 2 forestry schools, 2 technical mining schools, 2 agricultural high schools, 2 veterinary high schools, 214 other agricultural schools, besides many schools of art and music. In addition to the libraries of the several universities, there is the Royal Library at Berlin, with 800,000 vols. and about 15,000 MSS. Among the numerous scientific, artistic, and literary schools and societies of P. the following are some of the more distinguished: the Acad. of Arts, founded 1696; the Royal Museum of Arts; the Acad. of Sciences; the Nat. History, Geographical, and Polytechnic Societies of Berlin, etc.

Justice.—Formerly, the *Code Napoléon* was in force in the Rhenish provinces; and in Hither-Pomerania, the common German law; but in other parts of the kingdom, the Prussian code, compiled under Frederick the Great's direction, was followed. A new penal code was promulgated 1850, by which all pre-existing seigniorial, municipal, or ecclesiastical rights of decreeing punishments were unconditionally abrogated. A partial codification was brought about 1862; and 1869 a code of commercial law valid for the N. German Confederation. Since the establishment of the empire, imperial law has precedence of that peculiar to the various states in a large number of subjects. A universal criminal code is now in force for the whole empire; and a common judicature bill for the empire at large was introduced 1879. Prussia has 15 *Oberlandesgerichte* or provincial courts, one or more in each province. Connected with that sitting at Berlin is the privy-council of justice, which has jurisdiction over the royal family and the princely houses of Hohenzollern. The supreme tribunal of the empire has been established, not at Berlin, but at Leipzig.

Army and Navy.—The budget estimates for 1894-5 gave the strength of the Prussian contingent of the Imperial army as 21,404 officers, surgeons, etc., and 431,644 men, with 76,382 horses. On the war-footing, the numbers can

be raised to 900,000. The army consists of the regular troops and the Landwehr (q.v.), and in time of war an extra force can be called up under the title Landsturm. Every able-bodied male Prussian is liable to be called to serve between 20 and 36 years of age (see GERMANY). Mennonites (see ANABAPTISTS), clergymen of the Rom. Cath. and Evangelical churches, and indispensable supporters of families, are exempt. The time of active service is three years for some branches of the service, two years for others. In peace, the army lies distributed over 309 garrison towns and 29 fortresses, of which latter the following are fortified places of the first rank: Mainz, Coblenz (with Ehrenbreitstein), Cologne, Königsberg, Magdeburg, Spandau, and Posen. Great care is bestowed on the education and military training of officers and men; and besides numerous admirable academies, there are several good schools of operative and veterinary surgery, etc., connected with the educational department of the army. The navy of the new German empire is the navy of Prussia: see GERMANY.

Constitution, etc.—P. was an absolute monarchy till the crisis of 1848, when the decided movement in favor of liberal views compelled the king to convoke a national assembly, and submit to the establishment of a constitutional form of government, which has been repeatedly modified. The national representative body consists of two bodies—1. An upper chamber (*Herrenhaus*, or 'house of lords'), which is now composed of the princes of the royal family who are of age, the chiefs of the mediatized princely houses, recognized by the Congress of Vienna and numbering 16 in P., the heads of the territorial nobility (about 50), life-peers chosen by the king from the class of rich landowners, manufacturers, and 'national celebrities,' a titled representative chosen by all landowners in each of the Prussian provinces, representatives of the universities, the burgomasters of all towns having more than 50,000 inhabitants, and an indefinite number of members appointed by the king for life or for a limited period; 2. A lower chamber (*Abgeordnetenhaus*, or 'chamber of deputies'), of 433 members, 352 for the old kingdom, 80 for the provinces annexed in 1867, and 1 for Lauenburg in 1876. Every Prussian 25 years old, who has a municipal vote, has also an indirect parliamentary vote. Out of every 250 *Urwähler*, or electors in the first instance, is chosen a *Wahlmann*, or direct elector: this is the man who, strictly speaking, votes for a member of parliament. Representatives are elected for three years. In addition to this general house of assembly, there are representative bodies for the provinces, communes, and circles, which debate and legislate on local matters within their several departments. The council of state is composed of 8 ministers, under whose ministries are numerous departments, embracing almost every conceivable sub-division of foreign policy or internal legislation, since nothing can be done in P. in-

dependently of the state. By the modified constitution of 1850, all exclusive privileges arising from titles or station are abrogated, and perfect equality in the eye of the law fully recognized; liberty of the subject guaranteed in regard to religious persuasion; the right to hold meetings unarmed within closed doors and to become members of societies; immunity from domiciliary visits; inviolability of letters, etc. The monarchy is hereditary in the male line. The sovereign and royal family must profess the evangelical confession of faith. The king, who is not responsible for the measures of his govt., and whose decrees require the countersignatures of his ministers, exercises the executive power, nominates and dismisses the ministry, summons and dissolves the chambers, orders the promulgation of the laws, is commander-in-chief of the forces, has the right of proclaiming peace and war, granting reprieves, etc. He bears the titles King of Prussia, Margrave of Brandenburg, Sovereign-Duke of Silesia, Prince of Orange, Grand Duke of Pomerania and the Lower Rhine, besides a host of lesser titles. The title 'Emperor of Germany,' by which he is now best known, is not, of course, a Prussian dignity. The arms of P. are composed of four central shields borne on the great shield of 48 fields, representing the different territories incorporated in the Prussian monarchy. The black eagle on a field argent, surmounted by the open crown, is the special cognizance of P. proper. The national colors are black and white; the standard is white, bearing the Prussian crowned eagle and an iron cross in the right corner. The eldest son of the king bears the title Crown Prince. The ordinary royal residences are the palaces at Berlin, Potsdam, and Charlottenburg. The royal domains were ceded to the state by Frederick-William III. 1820, on condition of a rental of 2½ million thalers being paid first from them for the king and his family, which, however, has been largely increased of late years, by a *Kronfidei-Commiss* ('crown allowance'). Among the numerous military orders are the following: the order of the Swan, founded 1443; and that of the Black Eagle, founded 1701, regarded as of the highest dignity.

The P. budget for 1894-5 showed total revenue and expenditure balanced at 1,949,649,391 marks ($448,419,359). The debt of the kingdom proper, including provinces annexed 1886, was 6,371,504,354 marks ($1,465,446,001), and the sinking fund held 16,941,590 marks ($3,900,565).

Population, Races.—About seven-eighths of the people are Germans. Of the Slavonic tribes, the most numerous are Poles, 2½ millions. In Brandenburg and Silesia are about 83,000 Wends; in East P., more than 146,000 Lithuanians; Western P. has rather more than 10,000 Walloons, using the French language; intermixed in its generally German population, Silesia has 50,000 Czechs or Bohemians; Schleswig-Holstein, 150,000 Danes—making in all about 3 millions who do not use the German

language, or who use it only as secondary to their native tongues.

Ranks, Classes.—Three distinct hereditary classes are recognized in P.—nobles, burghers, and peasants. To the first belong nearly 200,000 persons, including the higher officials of the state, though that number does not comprise the various mediatized houses, of which 16 are Prussian, and others belonging to different states, but connected with P. by still existing or former territorial possessions. The burgher class includes, in its higher branches, all public office-bearers, professional men, artists, and merchants; while the peasantry—to which belong all persons engaged in agricultural pursuits—are divided into classes, depending on the number of horses employed on the land, etc.

History.—The lands bounded by the Baltic, which now form part of P., were early occupied by Slavonic tribes, nearly allied to the Letts and Lithuanians. It is conjectured that they were visited by Phœnician navigators B.C. 4th c.; but beyond the fact of their having come into temporary conflict with the Goths and other Teutonic hordes, prior to the great exodus of the latter from their northern homes, little is known of the people till the 10th c. after Christ, when they first appear in history under the name Borussi, or Prussians. In 997 Bp. Adalbert of Prague suffered martyrdom at their hands, while endeavoring to convert the people to Christianity. Boleslas, Duke of Poland, succeeded, however, about 1018, in compelling them to submit to baptism and subjection. After many futile attempts on the part of the people to throw off the yoke of Christianity and foreign domination, they finally made a successful stand against Boleslas IV. of Poland 1161, and for a time maintained a rude and savage kind of independence, which the disturbed condition of Poland prevented its rulers from breaking down. The fear of losing their freedom if they adopted Christianity made the Prussians obstinately resist every effort for their conversion; and it was not till the middle of the 13th c., when the knights of the Teutonic order began their 'famous' crusade against them (see TEUTONIC KNIGHTS), that the Christian faith was established among them. The inroads of the pagan Prussians on the territories of their Christian neighbors, and their advance into Pomerania, were the exciting causes of this important movement. The knights of the order, when appealed to by Conrad, Duke of Masovia, to aid in the subjection of the heathen, gladly promised their services, on condition of being permitted to retain possession of the lands which they might conquer; and having entered the Prussian territories in considerable numbers, they intrenched themselves at Vogelsang and Nessau 1230, and at once entered on the conquest of Prussia. For half a century the belligerent brotherhood were engaged in war with the people—winning lands and souls by hard fighting—until at length, 1283, they found themselves undisputed masters of the

country, which they had both civilized and Christianized after a fashion—namely, by almost exterminating the pagan population. During this period of struggle, the knights founded the cities of Thorn, Kulm, Marienwerder, Memel, and Königsberg, repeopled the country with German colonists, encouraged agriculture and trade, and laid the foundation of a well-ordered, prosperous state. The unhappy wars between the knights and the Poles and Lithuanians, together with the moral degeneracy of the order, led, in the 14th and 15th c., to the gradual decline of their supremacy. In 1454 the municipal and noble classes, with the co-operation of Poland, rose in open rebellion against the knights, who were finally compelled to seek peace at any cost, and, 1466, to accept the terms offered them by the Treaty of Thorn, by which West P. and Ermeland were ceded by them unconditionally to Poland, and the remainder of their territories declared to be fiefs of that kingdom. In 1511 the knights elected as their grand-master the Markgraf Albert of Anspach and Baireuth, kinsman of the king of Poland, and scion of the Frankish line of the Hohenzollern family. Although his election did not immediately result, as the knights had hoped, in securing them allies powerful enough to aid them in emancipating themselves from Polish domination, it was fraught with important consequences to Germany at large, no less than to the order itself. In 1525 the grand-master was acknowledged duke of P., which was converted into a secular duchy afterward known as East P., and renounced the Rom. Cath. religion for Lutheranism, his example being followed by many of the knights. The country made rapid advances under the rule of Albert, who improved the mode of administering the law, restored some order to the finances of the state, established schools, founded the Univ. of Königsberg (1544), and caused the Bible to be translated into Polish, and several books of instruction to be printed in German, Polish, and Lithuanian. His son and successor, Albert Frederick, having become insane, a regency was appointed. Several of his kinsmen in turn held the dignity of regent, and finally his son-in-law, Johann Sigismund, Elector of Brandenburg, after having held the administration of affairs for some years, was, on the death of the duke, 1618, recognized as his successor, both by the people and by the king of Poland, from whom he received the investiture of the duchy of P.; which, since that period, has been governed by the Hohenzollern-Brandenburg House.

Here it is necessary to retrace our steps briefly to consider the political and dynastic relations of the other parts of the Prussian state. In the 12th c. the northern Mark, comprising probably the territory between the Elbe and the Oder as far as its confluence with the Spree, was held by the immediate descendants of Albert the Bear of Luxemburg, its first hereditary markgraf, who, during the next two or three centuries, extended their dominions eastward, beyond the Oder into Further-

Pomerania. On the extinction of this line, known as the Ascanian House, a remote kinsman, Frederick VI., Count of Hohenzollern, and Markgraf of Nürnberg, became possessed, partly by purchase and partly by investiture from the emperor, of the Brandenburg lands, which, in his favor, were constituted into an electorate. This prince, known as Elector Frederick I., received his investiture 1417. He united under his rule, in addition to his hereditary Franconian lands of Anspach and Baireuth, a territory of more than 11,000 sq. m. His reign was disturbed by the insubordination of the nobles and the constant incursions of his Prussian and Polish neighbors, but by his firmness and resolution he restored order at home and enlarged his boundaries. Under Frederick's successors the Brandenburg territory was augmented by many new acquisitions, though the system of granting appanages to the younger members of the reigning house, common at that time, deprived the electorate of some of its original domains—e.g., the markgrafate of Anspach, which passed, on the death of Elector Albert Achilles, 1486, as an independent state to his younger sons and their descendants. The most considerable addition to the electorate was the one to which reference has already been made, and which fell to Elector Johann Sigismund through his marriage 1609 with Anne, daughter and heiress of Albert Frederick the Insane, Duke of Prussia. In consequence of this alliance, the duchy of Cleves, the countships of Ravensberg, the Mark, and Limburg, and the extensive duchy of P., now known as East P., became incorporated with the Brandenburg territories, which were thus more than doubled in area. The reign of Johann Sigismund's successor, Georg-Wilhelm (1619–40), was distracted by the miseries of the Thirty Years' War, and the country was alternately the prey of Swedish and imperial armies; and on the accession of Georg-Wilhelm's son, the great Elector Frederick-William (q.v.), 1640, the electorate was sunk in the lowest depths of social misery and financial embarrassment. But so wise, prudent, and vigorous was the government of this prince, that at his death, 1688, he left a well-filled exchequer and a fairly equipped army of 38,000 men; while the electorate, which now possessed a population of one and a half million, and an area of 42,000 sq. m., had been raised by his genius to the rank of a European power. His successors, Frederick III. (q.v.) (1688–1713) and Frederick-William I. (1713–40), each in his own way increased the power and credit of P., which had been, 1701, raised to the rank of a kingdom. The latter monarch was distinguished for rigid economy of the public money and an extraordinary penchant for tall soldiers, and left to his son, the great Frederick II. (q.v.), a compact and prosperous state, a well-disciplined army, and a sum of nearly nine million thalers in his treasury. Frederick II. (1740–86) dexterously availed himself of the extraordinary advantages of his position to raise P. to the rank of one of the great

political powers of Europe. In the intervals between his great wars, he devoted all his energies to the improvement of the state, by encouraging agriculture, trade, and commerce, and reorganizing the military, financial, and judicial departments of the state. By his liberal views in regard to religion, science, and government, he inaugurated a system whose results reacted on the whole of Europe: and in Germany, especially, he gave new stimulus to thought, and roused the dormant patriotism of the people. Frederick was not over-scrupulous in his means of enlarging his dominions, as he proved by sharing in the first partition of Poland, 1772, when he obtained as his portion nearly all W. Prussia, and several other districts in E. Prussia. His nephew and successor, Frederick-William II. (1786–97), aggrandized his kingdom by the second and third partitions of Poland, 1793 and 95. Frederick-William III. (q.v.) (1797–1840), who had been educated under the direction of his grand-uncle, Frederick the Great, succeeded his father, 1797, at a time of extreme difficulty, when continental rulers had no choice beyond being the opponents, the tools, or the victims of French republican ambition. By endeavoring to maintain a neutral attitude, P. lost her political importance, and gained no real friends, but many covert enemies. But the calamities which this line of policy brought on P. roused Frederick-William from his apathy, and with energy, perseverance, and self-denial worthy of all praise, he devoted himself, with his minister Count Hardenberg, to the reorganization of the state. In the ten years which succeeded the battle of Waterloo, P. underwent complete reorganization. Trade received a new impulse through the various commercial treaties with the maritime nations of the world, the formation of excellent roads, the establishment of steam and sailing packets on the great rivers, and at a later period the organization of the customs-treaty, known as the Zollverein (q.v.), between P. and the other states of n. Germany, and through the formation of an extended network of railways. The most ample provision was made for diffusion of education over every part of the kingdom, and to every class. In like manner, the established Prot. Church was enriched by the newly inaugurated system of govt. supervention, churches were built, the emoluments of the clergy were raised, and their dwellings improved; but not content with that, the king wished to legislate for the church in accordance with a set plan; and when the various Prot. churches refused to be joined in the union prescribed for them, difficulties arose. This tendency to over-legislation has long been the predominating evil feature of Prussian administration; thus the state, without regard to the incongruous elements of which it was composed, was divided and subdivided into governmental departments, which, in their turn, under some head or other, brought every individual act under governmental supervision, to the utter annihilation of political independence. The people,

when they began gradually to comprehend the nature of this administrative machinery, saw that it made no provision for political and civil liberty, and demanded of the king the fulfilment of his promise in 1815 of establishing a representative constitution for the whole kingdom. This demand was not acceded to by the king, and its immediate fruits were strenuous efforts on his part to check the spirit of liberalism. Every measure taken by other sovereigns to put down political movements was vigorously abetted by him. Siding with the pietists of Germany, he introduced a sort of Jesuitical despotism, which was continued by his successor, Frederick-William IV. The Landstände or provincial estates, organized in accordance with the system of the middle ages, were the sole and inadequate mode of representation granted to P. in this reign, notwithstanding the pledge made to the nation for a full and general representative government. An attempt made forcibly to unite Lutheran and Reformed churches excited universal indignation, while the imprisonment, at a later period, of the abps. of Cologne and Gnesen for their conduct in regard to the vexed question of mixed marriages, involved the king in a long and fruitless dispute with the pope. The accession of Frederick-William IV. 1840 seemed to open a better prospect to the friends of constitutional freedom, but the reality was scarcely equal to the expectations raised by the professions of the government. Still, new hopes and requirements had been excited, and a new life was infused into every department of the state. Every branch of science, art, and literature was understood to receive the attentive consideration of the sovereign, who professed to be (and, doubtless, in a sort of way, was) actuated by a love of universal progress. He made similar professions in regard to religious toleration, but the pietistic tendencies of his govt. exerted a forced and therefore prejudicial influence in every dept. of the state; while the bureaucratic spirit of over-governing which characterized the administration was becoming daily more and more irksome to the nation, and gave rise to the formation of free churches or Prot. communities; while a contemporaneous excitement which had arisen in the Rom. Cath. Church of P., as the result of the schismatic movement due to the stand taken by the chaplain Ronge (q.v.) on the exhibition of the so-called Holy Coat of Treves (q.v.), further complicated the relations between church and state. The king and his advisers, underrating the importance of the movement of 1848 in Germany, thought they had satisfied the requirements of the hour by granting a few unimportant reforms, and making equivocal promises of further concessions. When at length, however, the citizens and troops came into collision, and blood was shed, Frederick-William came forward as the professed regenerator of his country, offering to lay down his royal title and merge his kingdom in the common fatherland, for the salvation of which he

recommended a cordial union of all German princes and people in one bond, and proposing himself as the guide and leader of this new Germany. His own subjects, and many Germans in other states, hailed with delight professions which seemed to give a living embodiment to the national desire for unity. The publication of a political amnesty, the nomination of a liberal ministry, the recognition of a civic guard, the retirement of the Prince of Prussia, the heir-presumptive—with whom every arbitrary measure of government was believed to originate—and the summons of a representative chamber to discuss the proposed constitution—all tended to allay the general discontent. It might have been well if the German states and the German democracy had resolved at this time to accept the leadership of P., but the so-called national assembly at Frankfurt declined to do this, and elected Archduke John of Austria lieut.-gen. of Germany. A feeling of deep chagrin on the part of the Prussian king was the result of that extremely unwise and unpatriotic act, dictated by a fear of Prussian military strength, and oblivious of the fact that P., in spite of its despotic govt., was the country most thoroughly penetrated by German ideas. His ardor in the cause of the fatherland cooled, his pledges to his own subjects remained unfulfilled so long and as completely as the occasion permitted, and his policy became more strongly tinged than before with a jealousy of Austria. His powerful co-operation in putting down the insurrection in Poland and the democratic party in Baden gave, however, ample proof of his determined opposition to every popular demonstration against absolutism. In the first war of the Schleswig-Holstein duchies, the Prussians acted in concert with the disaffected against their sovereign, the king of Denmark, occupying the ducal provinces in the name and on the behalf of the diet. The latter years of this reign were characterized by great advance in the material prosperity and internal improvement of the country. Extensive lines of railway and post-roads were opened, the river navigation greatly facilitated, treaties of commerce formed with foreign countries, and great expansion given to the Prussian and North German Zollverein (q.v.), the army put on a footing of unprecedented efficiency of arms and artillery, and the educational system of the country still further developed. The political freedom of P. did not, however, make equal advance. The chambers which met for the discussion and framing of a constitutional mode of govt. were constantly interrupted and obstructed in the prosecution of their task, and the constitution was modified every year between 1850 and 57, until it retained few of its original bases. Wilhelm I., who succeeded his brother 1861, and in 1871 became German emperor, was no more a lover of constitutional, or at least of popular, liberty than any of his predecessors; and for some years he strove hard to check the popular movement, so far as it aimed at

interference with the absoluteness of regal power, and he repeatedly rejected measures of reform recommended by the Prussian chamber of deputies; but, on the other hand, it must be allowed that he showed himself zealous for the honor and greatness of Germany above all other princes of the empire; and the exigences of the great war with France (1870–1) compelled the Prussian govt. to bring itself into closer relations with popular feeling, though constitutional freedom is still far from being fully enjoyed.—For the later history of P., both military and political, see GERMANY: SCHLESWIG-HOLSTEIN: BISMARCK.

PRUS'SIA: province of the kingdom of Prussia, now usually divided into the two provinces East P. and West P. The joint province of P. is bounded w. and n.w. by Pomerania and the Baltic Sea, and e. and s. by Russia and Poland. East P. has 14,280 sq. m.; pop. (1890) 1,958,663: West P., 9,852 sq. m.; pop. (1890) 1,433,681. About two-thirds of the soil consists of good land, the remainder being chiefly sandy. Agriculture is by far the most important branch of industry, manufactures being confined to such articles as supply merely local wants. Wheat is extensively cultivated, especially in the dist. of Gumbinnen; and, as the inhabitants live chiefly on rye, the larger half of the wheat grown is exported. P. possesses a larger number of horses than any other province in the kingdom. For the history of the province of P., and for its principal physical features, see PRUSSIA (Kingdom of).

PRUSSIAN, a. *prŭsh'ăn:* from or relating to Prussia: N. a native of Prussia. PRUSSIAN-BLUE, a well-known pigment of a rich blue color, obtained from ferro-cyanide of potassium and iron: see BLUE: CYANOGEN: FERROCYANOGEN: FERRICYANOGEN. P.-BROWN, a pigment, an iron oxide obtained from an aluminous Prussian-blue by calcination. P.-GREEN, a pigment, being a preparation of Prussian-blue and gamboge. PRUSSIATE, n. *prŭs'shi-āt,* a term applied to supposed compounds of prussic acid with bases, now known as cyanides. PRUS'SIC, a. *-sik,* a common epithet of a deadly poison (*prussic acid*), originally obtained from Prussian-blue, existing also in the laurel, and in the bitter kernels of fruit, etc., prepared commercially from the prussiate of potassa; hydrocyanic acid: see HYDROCYANIC ACID.

PRUTH, *prōth*, Ger. *prūt*: important affluent of the Danube, rising in the s.e. of the Austrian crown land of Galicia, on the n.e. side of the Carpathian Mts., and near the base of Mt. Rusky in that range. It flows e. in a deep valley past Kolomea and Czernowitz, and from the point at which it leaves Austrian territory to its embouchure in the Danube at Reni, 12 m. below Galacz, it forms again, as it did before 1856, the boundary between the Russian province of Bessarabia and Roumania. Length about 500 m. Swift in its upper course, the P. becomes navigable near Jassy. Its affluents are numerous, but inconsiderable.

PRUYNE, *prūn*, MARY: died Albany, N. Y., 1885; missionary. She was sent by the Women's Union Missionary Soc. of New York to Yokohama 1871, and Shanghai 1882; and besides engaging in general missionary work, established in each city an American mission home for girls. Her earnest labors undermined her health, and she died during her second visit home for rest.

PRY, v. *prī* [probably Scot. *prize* or *prig*, to raise by a lever, to force up or open, as a lid or door; or perhaps a corruption of *peer*, to gaze]: to inspect narrowly or closely; to attempt to discover something with scrutinizing curiosity: N. narrow inspection. PRY ING, imp.: ADJ. inspecting closely; inquisitive; curious. PRIED, pp. *prīd*. PRY ER, or PRI ER, n. *-ėr*, one who pries. PRY'INGLY, ad. *-li*.

PRYAN, n. *prī an* [Cornish, *pryi*, clay]: in *mining*, ore contained in pebbles with a mixture of clay; a white, fine, somewhat friable clay.

PRYNNE, *prin*, WILLIAM: 1600–1669, Oct. 24; b. Swainswick, near Bath, England: pamphleteer and active politician in the reign of Charles I. and the subsequent Commonwealth. He received his early education at Bath; and 1620 he took his bachelor's degree at Oriel College, Oxford. Selecting the law as his profession, he entered himself at Lincoln's Inn, where he became a bencher and reader; but it does not appear that he ever seriously sought practice at the bar. He was early drawn into the vortex of ecclesiastical controversy, and speedily made himself heard of as a champion of the Puritan party, though his affiliation was entirely with the Presb. section—the Independents being from first to last the objects of his virulent attacks. In 1633 appeared his *Histriomastix, or a Scourge for Stage Players*, a tasteless and scurrilous attack on the popular amusements of the period, which procured him the attention of the authorities. For this performance he underwent prosecution in the Star Chamber, with results remarkable for severity. His sentence involved him in a fine of £3,000, degradation from the bar, expulsion from Oxford and Lincoln's Inn, the loss of both his ears in the pillory, and seeing his book burned in public by the hangman: he was, moreover, condemned to perpetual imprisonment, and immured in the Tower accordingly.

The severity of the punishment seems astounding in its disproportion to the nature and amount of the offense; but is explained by the fact that P., by his previous issue of a series of anti-prelatical tracts, as by other indications of hostility, had made himself most obnoxious to Abp. Laud and the clergy, who availed themselves of this occasion for revenge. In 1637 the pertinacious offender found means to publish from his prison another pamphlet, in which he fiercely attacked the hierarchy, and was unsparing in personal abuse of Laud and certain other bishops. For this he was again prosecuted; a fine of £5,000 was imposed on him; he was once more pilloried, losing such stumps of ears as the executioner before had spared; and was branded on both cheeks with the letters S. L. (Seditious Libeller). He was then removed to Caernarvon Castle, and afterward to that of Mont Orgueil, Jersey, with a view to perpetual imprisonment. He remained a close prisoner, till, in 1641—the Long Parliament then sitting—he was released by a warrant of the house of commons; and a tumultuous expression of popular sympathy, on his entrance into London, celebrated his restoration to liberty. Shortly afterward he was sent to parliament as member for Newport, in Cornwall, and for some years was actively, and, at times, even prominently, engaged on the popular side in the proceedings of the house of commons. With the Presbyterian party, however, P.'s antagonism was to the prelates rather than to the king. In the extreme measures leading to the deposition and death of the king, P. declined all share; and being one of those of whom Cromwell shortly afterward 'purged' the house of commons, he proceeded to assail him in print with an asperity not inferior to that with which he had before made war on the bishops; which imprudence subjected him to several years' imprisonment. P. was exceedingly violent against the Romanists; accused the Quakers of being Jesuits in disguise; and attacked Cromwell and the Independents for their congregational liberty in church govt., as menacing the rightful sovereignty of the civil state, endangering orthodoxy of doctrine, and involving toleration of diversities in ecclesiastical proceedings. P. was opposed especially to Cromwell's preference for entire religious toleration by government. On Cromwell's death he returned to his place in parliament, zealously interesting himself in the royal cause; and after the Restoration, the king bestowed on him the office of keeper of the records in the Tower. Subsequently, his inveterate habit of envenomed pamphleteering involved him in difficulties with the house of commons, from which, on charge of seditious libel, he narrowly escaped expulsion. He died at Lincoln's Inn in October, 1669. The continuous stream of writings on the perilous topics of the day, which brought him so constantly into trouble, represents only a fraction of P.'s literary activity. He busied himself chiefly as compiler of matter illustrative of constitutional and

parliamentary history. His most valuable works in this field are the *Calendar of Parliamentary Writs*, and his *Records*, both of which contain much that is useful and important.

PRYOR, *prī or*, ROGER ATKINSON, LL.D.: lawyer: b. near Petersburg, Va., 1828, July 19. He graduated at Hampden-Sidney College 1845, and the Univ. of Virginia 1848; studied law: became ed. of the Richmond *Enquirer;* was sent on a special diplomatic mission to Greece 1855; established the *South*, a states' rights paper, in Richmond; and was elected to congress to fill a vacancy 1859 and for a full term 1860, but did not take his seat under re-election. He was a member of the provisional and regular Confederate congresses; became a brig.-gen. in the Confederate army; was captured and confined in Fort Lafayette 1864; settled in New York and began practicing law 1865; had his political disabilities removed by congress 1880; was appointed a judge of the court of common pleas to fill a vacancy 1890; elected for 14 years 1891; and, under the constitution of 1894 which abolished that court from 1896, Jan. 1, serves the remainder of his term as a supreme court judge. He received his degree from Hampden-Sidney College.

PRYTANEUM, n. *prĭt-a-nē ŭm* [L.—from Gr. *prutaneion*—from *prutanis*, prytanis]: in *Gr. antiq.*, the public hall in ancient Greek states or cities; especially the public hall at Athens, in which the duties of hospitality were exercised toward citizens and strangers.

PRYTANIS, n. *prĭt a-nis* [Gr. *prutanis*]: in *Gr. antiq.*, one of a governing committee at Athens; one of the chief magistrates in several states, e.g., Corinth.

PRZEMYSL, *pzhĕm ĭsl:* town of the Austrian empire, province of E. Galicia, on the right bank of the San, an affluent of the Vistula, 53 m. w. from Lemberg. It is connected by railway with Cracow, and so with w. and n. Germany on the one hand, and with Lemberg on the other. P. is a flourishing town, with considerable trade, and manufactures of linens and leather. Pop. (1880) 22,373; (1890) 35,619.

PRZIBRAM, *pzhē brăm:* town of the Austrian empire, in Bohemia, 33 m. s.s.w. from Prague, on the Litawka, a feeder of the Moldau. It derives its importance chiefly from extensive lead and silver mines in the neighborhood, and is the seat of a superior court of mines. Pop. (1880) 11,020.

PSALM, n. *sâm* [L. *psalmus;* Gr. *psalmos*, playing and singing to the psaltery—from *psal'lō*, I sing to the harp: F. *psaume*]: a sacred song or hymn; one of the hymns by David and others which form a book of the Hebrew Scriptures. THE PSALMS, one of the books of the Old Test. (see below). PSALMIST, n. *sâm ist* or *săl'mĭst*, a writer or composer of psalms; a name applied to David, the anc. Jewish king, and the other authors of the Psalms. PSALMODIC, a. *săl-mŏd'ik*, or PSALMOD'ICAL, a.

-i-kăl [Gr. *ōde*, a song]: pert. to psalms. PSALMODIST, n. *sâl'mō-dist* or *sâm'ō-dist*, one who sings psalms. PSALMODY, n. *sâl'mō-di* or *sâm'ō-di*, art or practice of singing psalms (see below); also the psalms themselves. PSALMOGRAPHY, n. *sal-mŏg'rā-fi* [Gr. *graphō*, I write]: the art or practice of writing psalms. PSALMOG'RAPHER, n. *-rā-fẽr*, or PSALMOGRAPHIST, n. *-fist*, one skilled in writing psalms.

PSALMANAZAR, *sâl-ma-nā'zẽr*, GEORGE: notable impostor: about 1680–1763. His real name and his place of birth are unknown, but he is presumed to have been a native of Switzerland or s. France. He received a good education, and early showed talent, especially for acquisition of languages. Impelled by a restless and impatient temper, which indisposed him to any regular pursuit, for some years he roamed over Europe as a mere vagabond adventurer, assuming at first the disguise of an Irish pilgrim, exiled for his religion; and afterward as soldier, menial, preceptor, beggar, or vagrant nondescript, living on his wits as he could, according to the whim or necessity of the hour. In the course of his wanderings, he met Col. Lauder, commanding a Scotch regt. at Sluys, on whom first he passed the imposture which afterward made him notorious, assuming the name by which he is since known, and representing himself as a Japanese convert to Christianity and native of the island Formosa. The good col. seems to have been completely deceived by him; not so, however, the chaplain of the regt., one Innes, a man as acute as he was unprincipled, who speedily detected the deception, but was willing to use it for furtherance of his own ends. By Innes, P. was brought to England and instantly became the religious lion of the day, his patron skilfully availing himself of the connection to secure for himself preferment in the church. Dignitaries of the church contended for the honor of being serviceable to him; and through the influence of the bp. of Oxford, apartments were assigned him at the univ., that he might prosecute his studies there. The talent, ingenuity, and resource which he brought into play, in keeping up the deception, go far to account for the strange credulity with which his story was received. He published, in Latin, a fabulous account of the island Formosa, the consistency and verisimilitude of which imposed on the learned world. He also invented a language, compact and somewhat complex in structure; and was able, in virtue of an astonishing memory, to defy the ordinary methods of detection. In the midst of his success, however, at the age of about 32, he became the subject of religious impressions, and his conscience awoke to the ignominy of the deceit which he was practicing. Urged by what seems genuine penitence, he withdrew from public notice, and for the rest of his long life honorably earned his livelihood by literature, in which he had moderate success. Besides much assiduous compilation for the booksellers, of history, geography, and the like,

he published several works anonymously; one of which, *An Essay on Miracles, by a Layman*, was exceedingly popular. At his death in London, it was found that he had prepared for posthumous publication an account of his strange career, which was published under the title *Memoirs of ——, commonly known as George Psalmanazar, a reputed native of Formosa, written by himself.*

PSAL'MODY: the singing of the Psalms of David and other sacred songs. It is extended to include psalms themselves, arranged in metrical version for use in Divine worship; but from the beginning of the Reformation period, its meaning has been chiefly the singing of metrical versions of the scriptural Psalms to short, simple airs. Psalm-singing was of ancient date among the Jews, and was practised from the first ages of Christianity; the charge of Pliny the Younger against the Christians was, that they sung psalms to Christ '*quasi Deo*,' as to God. No authentic record exists of the kind of melodies sung to the Psalms by the primitive Christians: it is conjectured that they were some simple form of chant. The practice of singing psalms in antiphony, or by two choirs, as still practiced (see ANTIPHONY), was introduced early: it is said to have been begun in the Eastern Church by Ignatius, Bp. of Antioch, 2d c.; and in the Western Church by Ambrose, Bp. of Milan, 4th c. At first, the whole congregation, clergy and laity, joined in the psalm; but difficulties and abuses arose from the growing neglect of musical cultivation; and to restore public decency and order, the Council of Laodicea, 363, considered it necessary to forbid the laity to sing in church at all, except in some simple chants of a popular kind. Till the Reformation, the music of the church was surrendered to the clergy and trained musicians.

Psalmody, in the modern sense, began in the 16th c., when Clement Marot, court poet of Francis I. of France, translated 52 of the Psalms into French verse, dedicating them both to his royal master —whom he likened to the Hebrew psalmist —and to the ladies of France. The sacred song-book, on its first appearance, not being accompanied by music, it became the practice to sing the psalms to favorite tunes —often those of popular ballads; and for a considerable time psalm-singing became a favorite fashion among the gay courtiers of Francis. Marot's collection was continued and concluded by Theodore Beza, whose psalms had the advantage of being set to music, Beza having in this the assistance of Calvin, who engaged the best composers of the day to unite his sacred songs with pleasing and simple airs of devotional character. Psalm-singing was taken up by the Reformers, first for private devotion, and soon as part of the service of the church, Luther and Calvin restoring to the people their share in the musical part of public worship, and furnishing them with the means of performing it. From the time that psalm-singing was adopted by the Reformers, it was discountenanced by

the Rom. Catholics, and soon came to be regarded as a badge of Protestantism. Luther and Calvin differed, however, in their ideal of psalmody; Luther was favorable to harmony in parts, while Calvin confined himself to the bare unaccompanied melody. Once taken up by the Calvinists and Lutherans, psalmody spread over France, Germany, and the Low Countries, and reached England at the time of her embracing the Reformation. The first English metrical version of the Psalms was made in the reign of Henry VIII. by Thomas Sternhold, native of Hampshire, groom of the robes to King Henry, aided by John Hopkins and William Whyttinghame. Vocal psalmody was soon introduced into the church-service, the choral mode of singing being retained in cathedrals and collegiate churches, and the liturgic hymns being retained in the prayer-book. Of the psalm-tunes which came into use, some have been attributed to Claude Goudimel, Claude Le Jeune, and Guillaume Franc, and a few owe their origin to Luther. The well-known 100th Psalm is an adaptation of Gregorian phrases by Guillaume Franc. The first important collection of psalm-tunes for four voices published in England (1621) was made by Thomas Ravenscroft, MUS.BAC.; it was entitled '*The Whole Booke of Psalms*, etc., composed into four parts by sundry authors, to such several tunes as have been and are usually sung in England, Scotland, Wales, Germany, Italy, France, and the Netherlands.' In this collection were included contributions by Tallis, Morley, Dowland, and all the great masters of the day, as well as by Ravenscroft himself, who contributed the tunes St. David's, Bangor, and Canterbury. The name of John Milton, father of the poet, appears as composer of the tunes York and Norwich. According to the then prevalent usage, the subject or air was given to the tenor voice. This custom was departed from first in the *Whole Book of Psalms, in Three Parts*, pub. 1671, compiled and arranged by John Playford—whom Sir J. Hawkins calls the 'father of modern psalmody'—where we find the more proper practice, which has since obtained, of making the melody the soprano part. Croft, Courteville, Carey, the Bachs, and Händel, have since contributed to the psalmody in use in Britain and America.

Among other metrical versions of the Psalms was one of doubtful origin attributed to James I.; and which, notwithstanding a strong recommendation by his son, was never much used in churches. The version of the Psalms by Sternhold and Hopkins became supplanted in England, toward the beginning of the 18th c., by that of Nahum Tate (poet-laureate under William III. and Anne) and Dr. Nicholas Brady, less literal in its renderings than its predecessor, and commonplace in poetical character. This *New Version of the Psalms* appeared 1698, with the royal authority allowing its use in churches. Of late years, modern hymns, selected according to the taste and at the will of the incumbent, have almost en-

tirely superseded metrical psalms in the Church of England.

In Scotland, the early Reformers gave great attention to singing. In John Knox's Psalter, arranged for use in churches, the metrical psalms are set to music in harmony of four parts. Several early translations of the Psalms were produced in north Britain, but that of Sternhold and Hopkins was used in worship from 1564 till the middle of the 17th c. In 1632 an attempt made by Charles I. to supersede it by King James's version was more resolutely and decidedly opposed than in England. The version now in use in Scotland was introduced during the Commonwealth by the gen. assembly, and founded on the metrical translation of Francis Rous, a member of Cromwell's council. This new version was appointed by the gen. assembly 1649 to be the only paraphrase of the Psalms sung in the Kirk of Scotland. About the beginning of the 18th c., an agitation began for the enlarging of the psalmody of the kirk, by adding to it paraphrases of other portions of Scripture. A collection of such paraphrases was published 1745, and was widely used. In 1775 a committee was appointed to revise it; and 1781 the collection which has been so long in use was sanctioned by a *permissive* act of assembly. In addition, separate hymn-books are now sanctioned in the Established and Free Churches of Scotland, and have long aided in the worship of the United Presb. Church.—See HYMN.

PSALMS (Heb. *Tehillim*, Songs of Praise, or *Tefilloth*, Prayers; Jerome, *Liber Hymnorum*): canonical book of the Old Test., generally ascribed to David. The single hymns contained in the book are variously designated either as 'Prayer' (Tefilah, as 'Praise' Tehillah); or, from some special characteristic, 'Song' Shir); or a song of deeper meaning (Michtam, 'Instruction' Maskil), or a dithyrambic poem (Shigayon). In general contents the book comprises, in the form of pious lyrics, written for and on behalf of the congregation, the quintessence of the dogmatical, ethical, historical, and theocratical portions of the Old Test. The essence and holy character, and qualities, of Jehovah, the Only Living God, His providence and its guidance, especially of Israel, His rule of the universe, the nature of the human heart and its relations to God and His revelation, the blessings of the theocratic community—these and similar reflections form the themes of its ever-varying modes. A certain more spiritual conception of the ordinances of the Pentateuch is visible throughout, and though strict adherence to these is enjoined, yet their deeper meaning is impressed more strongly still. Used as a liturgical hymn-book in the Temple, it has been bodily received for the same purpose in the Christian Church; and certain additional hymns which occur in the Greek and Syriac Psalter have not been sanctioned by the authority of the general church. There are, in all, 150 canonical hymns or psalms, which, after the model of the Pentateuch, have been

divided into five books—thus: i.—xli.; xlii.—lxxii.; lxxiii.—lxxxix.; xc.—cvi.; and cvii.—cl. The Syriac, the LXX., and the Vulgate versions differ in some respects in their counting. The Authorized Version, however, follows strictly the Massoretic Jewish text, except in numbering the verses; for while the latter includes the superscriptions among the verses, the former does not. This division into five books is, as it is traditional, also the most natural; and the doxologies at the ends of psalms xli., lxxii., lxxxix., and cvi., further mark the respective ends of the special divisions. A further division, or rather classification, has been attempted according to the contents; but, considering the constantly changing variety of moods and sentiments, of manner and contents, which these songs exhibit, it is a doubtful one.

The P. have generally—only 34 excepted—superscriptions more or less expressive of the contents of the special hymn, and sometimes with, sometimes without, the name of an author. In some, certain notes are added, referring to the musical and liturgical part, which now are far from clear—e.g., 'On the octave,' 'For the chief musician,' 'On Machalath' (illness?), 'In the time of death to the son,' 'The hind of Aurora,' 'Lilies,' 'Dumb dove among strangers,' etc. One of the greatest puzzles is the word Selah, which occurs several times at the end or in the middle of some psalms, and which the LXX. render Diapsalma, 'Interlude,' but about whose real signification numerous unsatisfactory suggestions have been made at various times. Thus, it has been identified with amen, hallelujah, piano, etc. It seems certain that it was a kind of catch-word or sign for the performers. These headings belong probably to the individual poets themselves, and not to the collectors, as has been surmised.

The authorship of the P. is ascribed by the headings of the various chapters as follows: Ps. xc.—one of the most ancient in form and contents—is attributed to 'Moses, the man of God.' 73 are inscribed with David's name; 2 with Solomon's; 12 with that of Asaph, the Levite and singer, of which 5, however, belong to the times of Jehoshaphat, Hezekiah, and the beginning of the Babylonian exile, respectively. 11 stand under the name of the Sons of Korah, or of the Korahites—a family of singers descended from the Levite Korah, known from the Pentateuch. Their head in David's time was Heman. Part of these P. belong to the time of David; others, to that of Solomon; others are of uncertain later period. Respecting Ps. xc., inscribed 'Prayer of Moses,' there seems no valid reason against its authenticity; it is quite worthy of the great legislator, and to a noticeable extent similar to other compositions of which he is reasonably regarded as author. The numerous body of P. attributed to David manifest (those at least which can fairly be believed his work) a vivid and profound feeling and rare poetical gifts. The singer abandons himself entirely to

whatever feeling of joy or grief, repentance or revenge, piety or despair, sweeps over his soul. This also accounts to a certain extent for the violent manner in which he calls down at times the vengeance of God upon the heads of his adversaries; while at others, he humbles himself to the dust on account of his own iniquities. As to his style and manner, his lyrics have deservedly been counted among the gems of all human literature for well-nigh 3,000 years—quite apart from their sacred liturgical character. Asaph's psalms show their author as a didactic poet of high order; but, as was said above, many ascribed to him belong to poets later than the schism between Judah and Israel, later even than the Exile. The Korahite P., though all more or less fraught with the same depth of feeling, the same conciseness, the same grandeur and lyrical exaltation, exhibit signs of being written partly during the time of Solomon, or even during the Exile. Of the anonymous P., some may fairly be added to the number of those that issued from the hand of the royal singer himself; others, however, belong to post-exilian times. Some of these (e.g., the hallelujahs, or the "Songs of Degrees") were probably pilgrim-songs, chanted during the ascent to the sanctuary. Whether other P. belong to the Maccabean period or not—a question hotly disputed—we cannot discuss here.

There is much in favor of the opinion that the collection and redaction of the book, as we have it now, is owing to one man, who arranged the single psalms according to their contents and tendency. Thus, following all the while the law of analogy, it is conjectured that the redactor gave the first place to David's and his contemporaries' (Asaph, Ethan, Heman) compositions. These were further classified according to the prevalent use of the peculiar Divine name (Jehovistic and Elohistic), and were divided into three books—the first containing the Davidic Jehovistic P.; the second, the Elohistic ones of the Korahites, of Asaph, David, Solomon, and some unknown poets; the third, the rest of Asaph's and the Korahite P. of a mixed Jehovah-Elohistic, or purely Jehovistic nature: see ELOHIM; ELOHIST; JEHOVAH. The arrangement within these larger classes was made according to the inner nature and relation of these hymns to each other, and by a certain likeness in phraseology, similes, etc. Ps. i. and ii. were then prefixed, on account of their generally introductory matter and manner. The same laws have been followed in the remaining portions of the collection.

It is difficult to fix the period of the redaction. Assuming, however, the collecting and editing to be the work of one man, he could not possibly have lived before the time of Nehemiah, even according to those who affirm the non-existence of Maccabean psalms in our canon. If, on the other hand, various single collections are assumed, out of which our present book has grown, there is no reason why some of those should not be

placed at much earlier date.—A select list of writers on the P. would stretch far beyond our limits. Nearly all the principal authorities in biblical literature, in the Jewish, Roman, and Prot. churches, have contributed to the elucidation of the P. (see the individual works of the chief biblical commentators). Le Long, in his *Bibliotheca Sacra*, enumerates more than 500 commentaries on the P., and Calmet carries the number up to 1,000. Of these, some are very voluminous, that of Le Blanc filling six folio volumes.

PSALTER, n. *sawl'tĕr* [L. *psaltērĭŭm;* Gr. *psaltēriòn*, a stringed instr. of the lute kind—from *psal'lō*, I sing to the harp: It. *salterio:* OF. *psaltier*]: the Book of Psalms bound up in a separate book; in the *Rom. Cath. Chh.*, the psalms as they are recited in the daily office; a rosary of 150 beads. PSALTERIUM, n. *sawl-tē'rĭ-ŭm*, a psalter; the manyplies or third cavity of the stomach of a ruminant animal; in *anat.*, a part of the brain, consisting of lines impressed upon the under surface of the posterior part of the body of the fornix.

PSALTERY, *sawl'tĕr-ĭ* [Gr., stringed musical instrument]: instrument of music of the zither type: it differs from the harp in having a sounding-board back of the strings. The instrument called, in the English version of the Bible, P., appears to have been a small stringed instrument, a harp or lyre, whose strings were touched by the player's fingers; but the Hebrews seem to have had also a sort of lyre, whose strings were struck with a *plectrum*. According to Josephus, the latter instrument had 10 strings, the former 12. The mediæval P. was of trapeze form, and was strung horizontally: its compass was nearly that of Guido's scale.

PSAMMENI'TUS, or PSEMETEK': see PSAMMETICHUS.

PSAMMETICHUS, *săm-mĕt'ĭ-kŭs* or *săm-mē-tī'kŭs*, I., King of Egypt, of the 26th dynasty: reigned, according to Manetho, B.C. 664 (or 663)—B.C. 610 (or 609); son of Necho I. After the defeat and death of his father, he fled into Syria, and thence, by foreign aid, appears to have established himself as one of the 12 monarchs who then reigned over Egypt, with the rest of whom he was connected in a kind of federation. An oracle having declared that the monarchy of the whole country should go to that one who made a libation out of brass, P. fulfilled the condition by pouring it out of a brazen helmet. By the answer of another oracle, he was told that he should succeed by means of brazen men who would appear from the sea. Some Carian and Ionian pirates who appeared soon after in panoplies of brass, on the shores of Egypt, answered the response of the oracle. P. engaged them in his service, and by their means finally subdued his rivals at Momemphis, after a struggle of 15 years. He strengthened his power by employing Greek mercenaries, whom he settled at Daphnon and Pelusium, to protect the e. borders of Egypt, and whose headquarters were subsequently transferred to

Memphis. To them he assigned the right wing, or post of honor, in the army—their arms and discipline being far superior to those of the native troops. This proceeding gave great disgust to the Egyptian army, and on his refusing to send the Greeks home, after their term of service, the Elephantine garrison, of 240,000 men, deserted the country, and marched into Ethiopia beyond Meroë. Although exhorted, they refused to return. To protect Egypt from the Syrians, he besieged Azotus, which he finally took, after 29 years' siege. P. fostered in every way the Greek influence in Egypt, divided lands among them, encouraged the study of the language, and contracted alliances with the Athenians. He also facilitated commerce, and opened the ports which had been closed. Under P., the arts revived, sculpture and architecture imitated the older prototypes, and the government was remodelled on the plan of the ancient dynasties. In literature, a new handwriting, the demotic, was introduced. Egypt, however, had fallen into a national decadence, and its old polity and institutions, subverted by the foreign influence prevalent in the country, could not be restored. P. reigned, according to Manetho, 54 years.—Two later kings of the same name and of the same dynasty are distinguished on the Egyptian monuments by different prænomens.—P. was the name also of two other persons in anc. history.—Herodotus, ii. 154; Pliny, *Nat. Hist.* vi. 35; Diodorus, i. 67; Champollion-Figeac, *L'Egypte*, 367-370; Sharpe, *Hist. Egypt*, 58.

PSAMMITE, n. *sâm'mīt* [Gr. *psammos*, sand]: among *geologists*, fine-grained, fissile, clayey sand-stone, in contradistinction to those more siliceous and gritty. PSAMMITIC, a. *sâm-mit'ik*, pert. to or containing psammite.

PSAMMOMA, n. *sâm-mō'mâ* [Gr. *psammos*, loose earth, sand]: a tumor usually found in the brain and its appendages, whose characteristic feature is the occurrence of calcareous matter, or 'brain sand,' in the centre of small concentric lobules.

PSAROLITES, n. plu. *sâr'ō-līts*, or PSAR'ONITES, n. plu. *-nīts* [Gr. *psāros*, speckled; *lithos*, a stone]: in *geol.*, silicified stems of tree-ferns, found abundantly in the New Red Sandstone, which have a speckled or star-like appearance, and are popularly called *star-stones*.

PSELLISMUS, n. *sēl-iz'mŭs* [Gr. *psellis'mos*—from *psellizō*, I stammer]: in *med.*, hesitation of speech; bad utterance.

PSEUDÆSTHESIA, n. *sū'dēs-thē'zhī-ă* [Gr. *pseudēs*, false; *aisthēsis*, perception]: in *med.*, false or imaginary feeling or sensation; imaginary sense of touch in organs that have been long removed.

PSEUDEMBRYO, n. *sū-dĕm'brī-ō* [Gr. *pseudēs*, false, and Eng. *embryo*]: the larval form of an echinoderm.

PSEUDEPIGRAPHY, n. *sū'dē-pig'rā-fi* [Gr. *pseudepigraphos*, having a false title—from *pseudēs*, false; *epi*,

upon; *graphō*, I write]: ascription of false names of authors to works. PSEUDEPIG'RAPHA, *-fă*, spurious writings; those especially that falsely claimed place among the Holy Scriptures. By some the word is used interchangeably for both the O. Test. and N. Test. apocrypha; by others, who receive the deutero-canonical or apocryphal books related to the O. Test. (formerly called Hagiographa) as good for edification, it is confined to the spurious writings related to the N. Test. The number of such remains, whether entire or fragmental, is very great; and includes some regarded as genuine and valuable, though not admissible to the sacred canon; but mostly they are palpable forgeries. They differ much in date; for, while some are extremely old, others are referred to the middle ages. The authorship is of like variety, including Jewish, Christian, and heretical. Among the examples may be mentioned the so-called Book of Enoch, Book of Lamech, Book of Elias, Preaching of Noah, the third Book of Maccabees; and, of those that relate to the N. Test., the well-known false gospels, acts of apostles, and apocalypses: see APOCRYPHA. PSEU'DEPIGRAPH'ICAL, a. *-grăf'i-kăl*, of or pertaining to pseudepigraphy.

PSEUDO, *sū'dō* [Gr. *pseudēs*, lying, false]: a word frequently prefixed to another, and meaning 'false; spurious;' in *scientific terms*, something deceptive in appearance, function, or relation.

PSEUDO-APOSTLE, n. *sū'dō-ă-pŏs'l* [*pseudo*, false, and *apostle*]: one who pretends to be an apostle.

PSEUDOBLEPSIS, n. *sū'dō-blĕp'sĭs* [Gr. *pseudēs*, false; *blepsis*, a beholding]: in *med.*, a term applied to depraved sight, in which objects are imagined or seen different from what they are.

PSEUDOBRANCHIA, n. *sū'dō-brăng'kĭ-ă* [Gr. *pseudēs*, false; *brang'chiă*, gills of a fish]: in certain fishes, a supplementary gill, which, receiving arterialized blood only, does not assist in respiration.

PSEUDO-BULB, n. *sū'dō-bŭlb* [*pseudo*, and *bulb*]: in *bot.*, a swollen aerial root of many orchids, resembling a tuber.

PSEUDOCARP, n. *sū'dō-kârp* [Gr. *pseudēs*, false; *karpos*, fruit]: in *bot.*, a term applied to such fruit as the strawberry, in which other parts are incorporated with the ovaries in forming the fruit.

PSEUDOGNOSIS, n. *sū'dō-nō'sĭs* [Gr. *pseudēs*, false; *gnōsis*, knowledge]: false knowledge; a false philosophy.

PSEUDOGRAPH, n. *sū'dō-grăf* [Gr. *pseudēs*, false; *graphō*, I write]: a piece of false writing. PSEUDOGRAPHY, n. *sū-dŏg'ră-fĭ*, false writing.

PSEUDOHÆMAL, a. *sū'dō-hē măl* [Gr. *pseudēs*, false; *haima*, blood]: in *zool.*, applied to the vascular system of the Annelida. PSEUDO-HEARTS, the segmental organs of Brachiopoda, formerly looked upon as hearts.

PSEUDOLOGY, n. *sū-dŏl ō-jĭ* [Gr. *pseudes*, false; *logos*, a discourse]: falsehood of speech.

PSEUDO-MARTYR, n. *sū dō-mär tĕr* [*pseudo*, and *martyr*]: a false martyr.

PSEUDOMORPHOUS, a. *sū dō-mŏr fŭs* [Gr. *pseudēs*, false; *morphē*, form]: applied to substances found in the form of regular crystals, but not possessing a crystalline structure. PSEU'DOMORPHS, n. plu. *-mŏrfs*, substances in the form of regular crystals, but not possessing a crystalline structure. PSEU'DOMOR'PHISM, n. *-fizm*, the state of having regular crystals, though not possessing the crystalline structure.

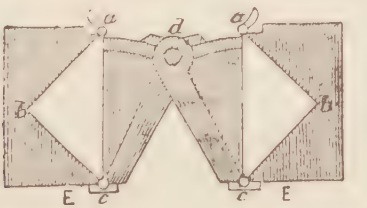
PSEUDONYM, n. *sū dō-nim* [Gr. *pseudēs*, false; *on ōma* or *on'uma*, a name]: a false name; a false signature. PSEUDONYMOUS, a. *sū-dŏn i-mŭs*, bearing a false name or signature applied to an author who uses a false or feigned name.

PSEUDOPHONE, n. *sū dō-fōn* [Gr. *pseudēs*, false; *phōnē*, a sound]: a false sound.

PSEUDOPIGRAPHY: see PSEUDEPIGRAPHY.

PSEUDOPODIUM, n. *sū dō-pō di-ŭm*. PSEUDOPODIA, n. plu. *sū dō-pō di-ă* [Gr. *pseudēs*, false; *pous* or *poda*, a foot]: in *bot.*, the leafless prolongation of the leafy stem in mosses, bearing the sporangium; in *zool.*, the extensions of the body-substance which are put forth by the Rhizopoda at will, serving for locomotion and prehension. PSEUDOPODIAL, a. *sū dō-pō di-ăl*, of or pert. to.

PSEU'DOSCOPE, n. *sū dō-skōp* [Gr. *pseudēs*, false; *skopeō*, I see or view]: in *optics*, an instr. which exhibits bodies, with their proper appearance as regards relief, reversed—thus a hollow body appears as if solid and convex. It was invented by Prof. Wheatstone. Its construction is shown by the annexed figure, *abc*, two rectangular prisms of flint-glass, the hypothenuses of which measure 1⅝ in.



in length, and 1⅛ in. in depth. The prisms are hinged at *c*, so that they may be inclined toward each other in any desired degree, and are fixed each in a wooden framework, fastened together by the hinge or pivot *d*. By means of the pivot *d*, the distance between *c* and *c* may be made to accommodate itself to the different interval between the eyes in various observers. In using the instrument, the eyes are placed at E and E respectively. The thumb-pieces attached to the prisms at *a*

and *a* are used in adjusting the instrument for distinct vision of any particular object. The optical effect of each prism is twofold: it displaces the object, and it procures the lateral inversion of the image. From the latter circumstance, it follows that the right-hand side of a cube, for example, is seen on the left, and *vice versa*; this inversion being occasioned by the *reflection* of the rays upon the side of the hypothenuse within each prism. By the two refractions undergone by the rays as they enter and leave the prisms, the axis of the emergent pencil is no longer directed toward the real place of the object, but is diverted in such sort that the convergence of the optic axes *diminishes* as the distance of the object *diminishes*, and *increases* as its distance *increases*—a complete reversal of the ordinary conditions of sight, and one which, in conjunction with the lateral inversion before mentioned, gives rise to very curious visual phenomena: see VISION. It is essential to the efficient use of this instrument that the object be seen by both eyes; therefore the observer, having placed the object at the usual distance for distinct vision, should, by closing the eyes alternately, ascertain that it is within the field of each prism. He should then adjust the prisms until the two images coincide in point of space, when they will coalesce, and, at first, the object will probably retain its natural aspect: but on a sudden, it undergoes a change, and the converse appearance stands out to view with the utmost distinctness and reality. A hat will appear turned completely inside out; the interior of a basin will appear convex and protruding; and 'a bust regarded in front becomes a deep, hollow mask.' To facilitate the illusion, the object should be equally illuminated on either side, to prevent shadows. —For full account, see the original paper by Wheatstone, *Phil. Trans.*, 1852, p. 11.

PSEUDO-SPERMOUS, a. *sū'dō-spĕr'mŭs* [*pseudo*, and *spermous*]: in *bot.*, applied to plants bearing fruits which contain a single seed, or but a small number, the pericarp of which so closely adheres to the seeds that they seem to have but one envelope.

PSEUDOVA, n. plu. *sū-dō'vă* [Gr. *pseudēs*, false; L. *ovum*, an egg]: the egg-like bodies from which the young of the viviparous aphis are produced.

PSHAW! int. *shaw* [of imitative origin]: an expression of contempt or disdain: V. to utter the int. pshaw. PSHAW'ING, imp. PSHAWED, pp. *shawd*.

PSID'IUM: see GUAVA.

PSILANTHROPIST, n. *sī-lăn'thrō-pĭst* [Gr. *psīlŏs*, bare, naked; *anthrōpos*, a man]: a name sometimes applied to those who believe that Jesus Christ was but an ordinary man, and really the son of Mary and Joseph.

PSILOMELANE, n. *sī-lŏm'ĕ-lān* [Gr. *psīlŏs*, bare, smooth; *melas*, black]: an amorphous manganese ore, usually occurring in botryoidal, kidney-shaped, or stalactitic masses, having a smooth surface, foliated texture, and dark glistening color.

PSILOPHYTON, n. *sī-lŏf'i-tŏn* [Gr. *psīlŏs*, smooth, bare; *phuton*, a stem]: in *geol.*, fossil stems from the Silurian and Devonian rocks, having closely pressed minute leaves, and springing from a root-stalk having circular areolæ.

PSITTACEOUS, a. *sit-tā'shŭs*, or **PSITTACID**, a. *sĭt'tă-sĭd* [L. *psittăcus*; Gr. *psittăkos*, a parrot]: of or relating to the parrot tribe—called the **PSITTACIDÆ**, *sĭt-tăs'i-dē*: see **PARROT**.

PSKOV, *pskŏv*, or **PLESKOV**, *plĭs-kŏf'* (Ger. *Pleskau*): government in n.w. European Russia, s. of the governments of St. Petersburg and Novgorod; 17,969 sq. m. The climate is temperate, surface hilly in the west, soil of average fertility. Lake Pskov and Lake Ilmen receive almost all the drainage of the govt., the river Velikaia falling into the former, and the Shelon, the Polista, and the Lovat into the latter. The rivers are navigable for rafts, and, near their mouths, for barges and ships. Lakes abound in the e. and s.e. districts. Agriculture is the staple employment; flax-growing being most remunerative. The manufactures are inconsiderable. The St. Petersburg and Warsaw railway, by which ready access is afforded to the metropolitan market for the agricultural productions of P., has given very beneficial development to the industry and resources of the government.—Pop. (1890) 965,355, almost all Russians, except in the w. districts, where there are a few Finns.

PSKOV, or **PLESKOV**': town in n.w. European Russia, cap. of the govt. of the same name; on the banks of the Velikaia, 180 m. s.s.w. of St. Petersburg by railway. During the 14th and 15th c. it was one in the confederation of the Hanse Towns, and had then a population greater than at present. In 1510 it was annexed to the kingdom of Moscow. During the wars with Lithuania, P. was a stronghold of great importance. It contains a cathedral, 42 churches, and 4 monasteries. Fish, obtained from Lake Peipus, and flax, are principal articles of a foreign commerce not extensive. Pop. (1880) 20,000.

PSOAS, n. *sō'ăs* [Gr. *psoai*, the muscles of the loins]: in *anat.*, applied to two muscles of each loin, the *psoas magnus* and *psoas parvus*—that is, the *great psoas* and the *little psoas*. **PSOADIC**, a. *sō-ăd'ĭk*, relating to or connected with the psoas.

PSORA, n. *sō'rā* [Gr. and L. *psōrā*, supposed to be the itch, the mange: Gr. *psōrāsis*, a being itchy or mangy—from *psaein*, to rub]: in *med.*, the itch; a rough scaliness of the skin; scabies. **PSORIC**, a. *sō'rĭk*, of or relating to psora; scurfy. **PSO'RICS**, n. plu. *-rĭks*, medicines for the itch.

PSORALEA, *sō-rā'lē-ā:* genus of plants of nat. order *Leguminosæ*, sub-order *Papilionaceæ*, having the calyx permanent after flowering, and its tube sprinkled with callous points; the legume one-seeded, sometimes ending in a beak. The flowers are blue, purple, or white. The leaves are of various forms, but in general abruptly pinnate. Some of the species are natives of India; others of other warm countries.—*P. esculenta*, the *Pomme Blanche*, or *Pomme de Prairie*, of the Canadian boatmen, is a herbaceous perennial, about 12 inches high, with carrot-like root, swollen above the middle, and abounding in farinaceous matter. It is used as food, both boiled and raw. Other N. American species of P. are *Onobrychis*, with elongated racemes; *Stipulata*, flowers in heads; *Melilotoides*, spikes oblong; *Floribunda*, racemes panicled; *Argophylla*, silvery white all over—the last three northwest.

PSORIASIS, *sō-rī'a-sis* [from Gr. *psora*—cutaneous eruption, supposed by some to be the itch]: chronic, non-contagious disease characterized by slight elevations of the surface of the skin, covered with whitish scales. There are various forms—e.g., *P. guttata* (the simplest kind, deriving its specific name from the scales not coalescing, but remaining distinct, like isolated drops of water on the skin); *P. diffusa*, when the disease spreads over large portions of the skin, and often renders the patient hideous to look at, the scaly incrustations being often interspersed with bleeding cracks and fissures in all directions; *P. inveterata*, merely the severest phase of the preceding form, occurring chiefly in aged persons of broken-down constitution; and *P. gyrata*, rare form, in which the disease occurs in narrow stripes or rings. The causes of P. are very obscure. It is certainly not contagious, but there appears to be in some families a hereditary tendency to it. It is occasionally associated with gout and rheumatism. Persons of either sex, of any age and condition of life, are liable to it, though it is more frequent in middle and advanced years than in childhood.—The *treatment* varies with the condition of the patient. A middle-aged vigorous patient should be purged two or three times a week with sulphate of magnesia, should be restricted in his diet to vegetables and milk, should be debarred from all stimulants, and should take a warm bath daily. The internal and external remedies of repute for this disease are such as should be employed only under professional advice.

PSOROPHTHALMIA, n. *sō'rŏf-thăl'mī-ă* [Gr. *psōrā*, the itch; *ophthal'mos*, the eye]: inflammation of the eye attended with itchy ulcerations.

PSYCHE, n. *sī'kē* [Gr. *psa chē*, the soul, a butterfly, breath]: in *Gr. myth.*, a beautiful maiden, the personification of the soul, who in *Cupid* married (see below): spirit; breath; soul. PSYCHIC, a. *sī'kik*, or PSYCHICAL, a. *sī-kik-kal*, relating to or connected with the soul, spirit, or mind. PSY'CHIC-FORCE, n. name given, 1871, by William Crookes, to what he believed to be a hitherto unrecognized force, which produced the phenomena of spiritualism.

PSYCHE, *sī'kē* [Gr., breath or soul]: a creation of the later mythology of Greece; or rather, a personification of the human soul, devised by the later poets. Apuleius (q.v.) relates the following story about her, which is obviously allegorical: P. was the youngest of three daughters of a king. She was so exquisitely beautiful that mortals mistook her for Venus, and did not dare to love, but only to worship, her. This excited the jealousy of the goddess, who sent Eros (Cupid) to inspire P. with a passion for the most contemptible of all men; but Eros was himself wounded as deeply by her glances as ever he had wounded others with his darts. Meanwhile, P.'s father wished to see his daughter married, and inquired about her at the oracle of Apollo, by whom he was told to bear the maiden in funeral robes to the summit of a hill, and to leave her there alone, as she was destined to be the bride of a huge all-destroying snaky monster, that terrified both gods and men. Amid loud wailing and lament, P. was borne to the fatal spot, and left trembling in horrible solitude, when suddenly a light-winged zephyr flew round her, and bore her off to a beautiful palace of pleasure belonging to Eros, who visited her, unseen and unknown, every night, and left her before morning broke. Here P. would have enjoyed perpetual delight, had she remembered the advice of her unknown lover, who warned her not to seek to know who he was. But her jealous sisters, whom, against Eros's injunction, she had allowed to visit her, working upon her curiosity, persuaded her that she was embracing a monster in the darkness of night; and having lighted a lamp when Eros was asleep, she saw with rapture that she was the mistress of the most handsome of gods. In her excitement, she let a drop of hot oil fall on the sleeper's shoulder, who awoke, upbraided her for her mistrust, and vanished. P. gave way to the most passionate grief; she even thought of drowning herself. After wandering about for some time, she came to the palace of Venus, where she was seized by the goddess, and kept as a slave. Eros, however, who still loved her, invisibly helped and comforted the hapless maiden, reconciled her to his mother, and was finally united to her in immortal wedlock. All critics have agreed to consider the story an allegory of the progress of the human soul through earthly passion and misfortune to pure celestial felicity.

PSYCHISM, n. *sī'kizm :* the doctrine of Quesne, that a certain subtle fluid everywhere diffused is the animating principle in men and the inferior animals, the different effects which it produces in each being caused by the differences in their several organizations; the doctrine that there exists in nature a certain psychic force.

PSYCHOLOGY, n. *sī-kŏl ŏ-jĭ* [Gr. *psu'chē*, the soul; *logos*, a word]: the doctrine of man's nature as concerns his soul or spirit or mind; the science of the phenomena of the mind, or conscious subject; mental philosophy; metaphysics (see MIND). PSYCHOL'OGIST, n. *-jĭst*, one who studies the nature and properties of the soul, spirit, or mind, or who writes on the subject; a mental philosopher. PSYCHOLOGIC, a. *sī-kō-lŏj'ĭk*, or PSY'CHOLOG'ICAL, a. *-ĭ-kăl*, pert. to psychology. PSYCHOLOGICALLY, ad. *-kăl-lĭ*.—See MIND : SOUL : CONSCIOUSNESS : INTELLECT : METAPHYSICS, and their various cross-references.

PSYCHOMACHY, n. *sī-kŏm'ă-kĭ* [Gr. *psu'chē*, the soul; *machē*, a contest]: a conflict of the soul with the body.

PSYCHOMANCY, n. *sī'kō-măn'sĭ* [Gr. *psu'chē*, the soul; *manteï'a*, divination]: a species of divination by consulting the spirits of the dead.

PSYCHOMETRY, *sī-kŏm'ĕ-trĭ* [Gr. *psu'chē*, soul; *metrein*, to measure]: definite measurement of the action of physical stimuli and the resulting psychical acts; also, the timing of these acts in their kinds and degrees. The research, aided by modern perfected instruments and methods of inquiry, is comparatively recent; was carried on by Weber, Fechner, Wundt, Volkmann, and others, for its intrinsic interest as psycho-physics, but now forms a large part of the new science of physiological psychology, and has been claimed by some to be in favor of materialism. The inquiry was mostly confined at first to ascertaining the minimum and the maximum of a sensation. In the course of this research, it was found, e.g., that if we can distinguish 16 oz. and 17 oz. of weight, by muscular sense, we shall be able to distinguish 32 and 34, but not 32 and 33, the addition in each case being $\frac{1}{16}$ of the preceding stimulus. On such experiments was founded Weber's, otherwise called Fechner's, law that the sensation increases as the logarithm of the stimulus. Fechner viewed this as a recondite relation between the material and the spiritual; Wundt, as purely psychological; others, as wholly physiological. Other experiments relate to the 'reaction-time' between nervous stimulus and the mental (manifested by bodily) response. Donders found it for touch $\frac{1}{7}$ of a second, for hearing $\frac{1}{6}$, for sight $\frac{1}{5}$—doubtless with elimination of the 'personal equation,' or by an average. But the attempt to bring purely mental acts into the category of physical has not been successful. Experiment proves that the logically distinct acts of perception and self-conscious perception and consequent volition may be reduced to the time of perception and even to that of reflex action. That complex psychical

PLATE 2. Propylon Pseudoscopic Illusions

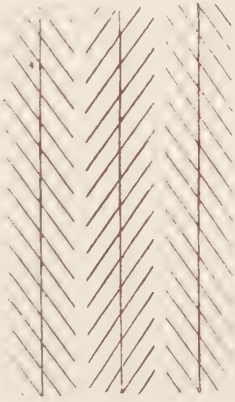
Propylon of Xerxes at Persepolis, B.C. 521-467.

PSEUDOSCOPIC ILLUSIONS.

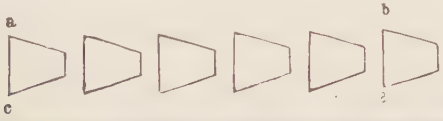
Though both parts of the line are of equal length, the divided half appears larger.

a and b are square, but a appears wider and b higher.

a and b are exactly the same size, but a appears much larger.



The lines a, b, c are parallel, though they do not appear so.



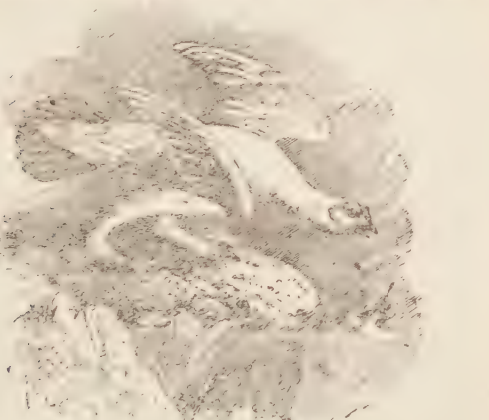
Each figure from ac to bd appears a little larger than the preceding one, though all are the same size.

processes are but the delay and turmoil of molecular forces, in ganglionic centres, is not proved. On this subject generally, see Ladd's *Physiological Psychology*, 2 vols., or his compendium of the same, 1 vol.—The term P. has been applied also to a charlatan pretense to diagnose disease at a distance by handling paper containing the patient's writing, or a lock of hair, etc.

PSYCHROMETER, n. *sī-krŏm'ĕ-tĕr* [Gr. *psu'chros*, cold or cool; *metron*, a measure]: an instr. for determining the quantity of vapor present in the atmosphere.

PTAH, *pta*, or PHTHAH, *fthā*: principal divinity in Egyptian mythology, worshipped as the creative force, or author of all visible things. He had at Memphis one of the most magnificent temples in Lower Egypt; his symbol was the insect *Scarabæus sacer*; and he was compared by the Greeks to their Hephæstos and by the Romans to their Vulcan.

PTARMIGAN, n. *tär'mĭ-gan* [Gael. *tarmachan*], (*Lagopus*): genus of *Tetraonidæ*, comprising birds differing from the true Grouse (q.v.) chiefly in having the toes, as well as the legs (*tarsi*), thickly clothed with short feathers—hence the name *Lagopus*, used by Pliny, from the resemblance of the foot to that of a hare. The bill is



Common Ptarmigan (*Lagopus mutus*).

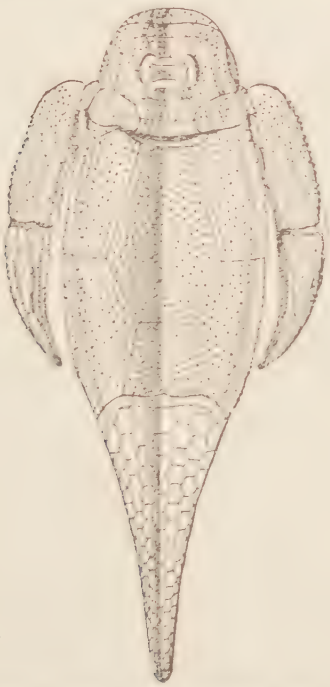
very short, and clothed at the base with feathers. The species are natives of northern regions, either elevated or strictly arctic. They are not polygamous, like the true grouse, and the males do not strut with erected and expanded tail. Most of the species change color very much on the approach of winter, assuming a white or nearly white plumage; and the diversities of color have caused confusion and difficulty concerning them. They all are much esteemed for the table. The COMMON P., or GRAY P. (*L. vulgaris* or *L. mutus*), is a native of the

most n. parts of Europe. It is abundant in Norway, from which great numbers are annually brought to the London market. In arctic countries, the haunts of the P. are not mountain-tops, but low valleys and plains even to the sea-shore. In form and habits, it much resembles the Moorfowl (q.v.), but is rather smaller. The winter plumage is pure white, except a black band above the eye of the male, and some parts of the quill and tail feathers. The summer plumage is as beautifully adapted to the concealment of the bird from enemies, by its harmony with the general aspect of the ground, as that of winter; the male being mostly brownish-gray, with undulating lines of black; the wings, middle tail-feathers, and under parts of the body, white; the female similar, but with prevalent yellow tinge. The plumage, however, varies very much, according to age, sex, and the season of the year. Ptarmigans seem to trust for safety to their facility in eluding observation, whether among the snows of winter or the lichen-covered rocks in summer; and an unaccustomed sportsman is often startled by a covey springing up close beside him, where he had not previously observed one. The P. is capable of being tamed, and has even been found to breed in confinement. The voice of the P. is a low croaking cry. The name P. is a modification of the Gaelic name. The *Rock P.*, said to occur in n. Scotland, and to be common in Norway, seems merely the common species in a particular state of plumage.—The Gray P. has a nearly related species in *L. rupestris* of N. America, Greenland, and Siberia. *L. leucurus* occurs in mountains of western N. America.—The Moorfowl (q.v.) is a species of P. in Great Britain, and is the only species that does not turn white in winter.—Another is the Willow P., or Willow Grouse (*L. saliceti*), of the n. parts of the world, abundant in arctic America, and in Norway, from which great numbers are brought to the London market. Its summer plumage resembles that of the moorfowl; but its winter plumage is white. It does not inhabit regions so cold or lofty as the Common P., but frequents thickets of willow and dwarf-birch. It is found in Europe as far s. as the valleys of the Alps. In N. America, it is partially migratory.—*L. hemileucurus* is found in Spitzbergen.

PTE'LEA: see Ephesus.

PTERICHTHYS, n. *ter-ik'this* [Gr. *pteron*, a wing; *ichthus*, a fish]: genus of ganoid fishes, peculiar to the beds of the Old Red Sandstone measures. Fragments of the bony case had been found in Russia as early as 1813; in 1840 they were described as belonging to a fish to which the generic name Asterolepis was given. In the same year, Hugh Miller exhibited to the members of the British Assoc. the first specimen which gave an idea of the form of the fish, and to this Agassiz applied the generally received name of P., from the wing-like appearance of the pectoral spines.

The head and anterior half of the body were covered with hard ganoid plates, fitting closely to each other, and forming a strong protecting case. The remainder of the trunk was flexible, and covered with small scales. The fish was furnished with a small dorsal fin, and the body terminated in a heterocercal tail; but neither of these, from their soft texture, is frequent in the fossil



Pterichthys Milleri (Dorsal Surface).—From Owen.

specimens. The creature was not fitted for rapid motion. The pectoral spines, at first erroneously supposed to be fins, were probably used as weapons of defense, and perhaps also assisted the P. to move along the sandy bottoms on which it lived. The spines were composed of two segments, and were covered with tubercles like the trunk. Twelve or more species have been described.

PTERIDOGRAPHIA, n. *tĕr'ĭ-dŏ-grăf'ĭ-ă*, or PTERIDOGRAPHY, n. *tĕr ĭ-dŏg'rà-fĭ* [Gr. *pteris* or *pteridα*, a fern; *graphō*, I write]: a treatise on ferns.

PTERO-, prefix, *tĕr-o-* [Gr. *pteron*, a wing, a feather]: having wings or wing-like processes; winged—used in scientific compounds.

PTEROCAR'PUS: see KINO.

PTER'OCLES: see GANGA.

PTERODACTYL, or PTERODACTYLE, n. *tĕr'ō-dăk'tĭl* [Gr. *pteron*, a wing; *dak'talos*, a finger]: remarkable genus of fossil lizards, peculiar to the Secondary strata. PTER'-ODAC'TYLOUS, a. *-tĭl-ŭs*, wing-fingered.—The anomalous structure of the P. was long a puzzle to comparative-anatomists. Blumenbach considered it a palmipede, or web-footed bird; while its original describer, Collini, and other naturalists more eminent, referred it to the mammalia, finding its nearest ally in the bat. The careful investigations of Cuvier, however, showed that the P. was a true lizard, but possessed of the power of flight, which it performed, not by a membrane stretched over its ribs, like the living dragons, but more as in the bats, except that the wing was attached, not to several, but only to a single finger—the fifth—the others being free and short. The bones of the fifth finger were very greatly elongated, and the last joint terminated in a long, slender, unguarded apex; the terminal joints in the other fingers were furnished with strong claws. Mantell thus graphically describes the genus: 'With a long-snouted head and long neck much resembling that of a bird, bat-like wings, and a small trunk and tail, with lacertian affinities in its skull, teeth, and skeleton, and with a bird-like structure of sternum and scapular arch, these creatures present an anomaly of structure as unlike their fossil contemporaries as the duck-billed ornithorhynchus of Australia to living mammals. The cranium is small; the jaws are long, and either armed with numerous sharp-pointed teeth, or toothless, like those of a bird. The eye-orbit is very large; the sclerotica consists of a ring of bony plates, and the nostrils are placed near the orbits. The cervical vertebræ are large and strong, and capable of great flexibility backward and forward, probably to allow the head to fall back to the centre of gravity during flight. The dorsal vertebræ are from 17 to 20 in number. The sacrum is formed by the coalescence of two vertebræ only, as in existing reptiles, and not of many, as in birds and certain extinct saurians. The tail is generally short, an unusual character with saurians; but a species with a long tail occurs at Solenhofen. There are five toes or digits on each foot; the outer finger of the forearm is immensely elongated for the support of a membranous expansion (the

Pterodactyl.

impression of which is preserved in some instances); and the other digits of fore and hind feet terminate in long curved claws. The size and form of the extremities show that the P. was capable of perching on trees, of hanging against perpendicular surfaces, and of standing firmly on the ground, when, with its wings folded, it might crawl on all-fours, or hop like a bird.' The famous quarry of Lithographic stone at Solenhofen, of Upper Oolite age, has supplied a great variety of these flying lizards; but the largest species *Pterodactylus ingens*, with an expanse of wings 25 ft., has been found in the Upper Cretaceous of Kansas; another species of nearly equal size was reported from the Upper Greensand, at Cambridge, England: and in the Kentish Chalk, another has been found very little smaller. The various species vary as much in structure as in form, so that the original genus has been lately raised to an order, under the name PTEROSAURIA, and the species have been arranged under the following genera, characterized principally by structure of the jaw and teeth: *Pterodactylus*, in which the jaws are furnished with long slender teeth along their whole length; *Rhamphorhynchus*, with extremities of the jaws smooth, probably furnished when living with a horny bill, and toward the bases of the jaws having four or five strong teeth; and *Dimorphodon*, with large strong teeth in front, and small shorter ones behind. Nearly 30 species altogether have been described.

PTEROMA, n. *tĕr-rō′ma* [Gr.—from *pteron*, a wing]: in *arch.*, spaces between the walls of the cella of a temple and the columns of a peristyle.

PTER′OMYS: see FLYING SQUIRREL.

PTEROPHYLLUM, n. *tĕr′ō-fĭl′lŭm* [Gr. *pteron*, a wing; *phullon*, a leaf]: in *geol.* a genus of cycadaceous leaves chiefly from the Lias and Oolite.

PTEROPODA, n. plu. *tĕr-ŏp′ō-dă*, or PTEROPODS, n. plu. *tĕr′ō-pŏdz* [Gr. *pteron*, a wing; *pous* or *poda*, a foot]: class of encephalous mollusks that swim by the alternate expansion and contraction of two wing-like fins attached to the sides of the head or neck. PTEROPODOUS, a. *tĕr-ŏp′ō-dŭs*, pert. to the pteropods; wing-footed. — The *Pteropoda* flap their two wing-like fins in the water as a bird or an insect does its wings in the air. They are allied to *Gasteropoda*, but are inferior to them in organization; and their wings are not at all homologous to the *foot* of that class. They are hermaphrodite. The head is perfectly distinct in some, but obscurely distinguished from the body in others. Those which have the head most distinct, as *Clio* (q.v.),

Example of the Pteropoda (*Cleodora pyramidata*).

have no shell, and form the order *Gymnosomata;* those with the head indistinct, the order *Thecosomata*, have a thin external shell, which in some is globular, with slits for the wings to pass through, in some triangular and pyramidal, in some conical, in some slipper-shaped, etc. All the species are marine; they are small and delicate creatures, very lively, always in quest of food, and affording food to fishes and cetaceans. They are found in all parts of the world, some of them in immense numbers in tropical, and some in arctic, seas. The genera and species are few.

PTEROSAURIA, n. plu. *tĕr'ō-saw'rĭ-ă*, or PTEROSAURS, *tĕr'ō-sawrs* [Gr. *pteron*, a wing; *sauros*, a lizard]: in *geol.*, an order of extinct saurians, fitted for aerial flight. PTER'OSAU'RIAN, a. *-rĭ-ăn*, of or pert. to: N. one of the pterosaurs.

PTERYGIUM, n. *tĕr-ĭj'ĭ-ŭm* [Gr. *pteru'giŏn*, a small wing—from *pterux*, a wing]: in *med.*, a disease of the mucous membrane of the eye, consisting of a thickening of the part between the external angle and the cornea; a disease in which the epidermis of the margin of the nail-follicle remains attached to the surface of the nail, and advances with its growth till the nail is more or less completely covered.

PTERYGO, *tĕr'ĭ-gō* [Gr. *pterux* or *pterŭga*, a wing]: a prefix denoting attachment to, or connection with, the pterygoid processes of the sphenoid bone. PTERYGOID, a. *tĕr'ĭ-goyd* [Gr. *eidos*, resemblance]: in *anat.*, applied to the wing-like processes of the sphenoid bone.

PTERYGOTUS, n. *tĕr ĭ-gō'tŭs* [Gr. *pterux* or *pterŭga*, a wing; *ous* or *ōta*, an ear]: in *geol.*, a fossil, gigantic, lobster-like crustacean.

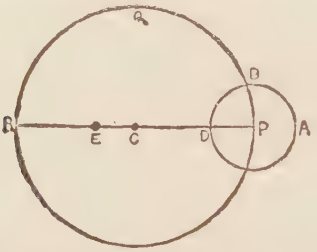
PTILOPORA, n. *tĭl-ŏp'ō-ră* [Gr. *ptilon*, a feather, a plume; *poros*, a passage]: in *geol.*, a genus of Carboniferous polyzoans, whose pores or cells are arranged in feather-like form on a common axis.

PTISAN, n. *tĭz'ăn* [Gr. *ptisanē;* L. *ptis'ănă*, barley crushed and cleaned]: a mucilaginous decoction, as barley-water; an aqueous medicine, containing little or no medicinal agent.

PTOLEMAIC, n. *tŏl'ĕ-mā'ĭk* [Gr. *Ptolemaios*, famous Alexandrian Greek, geographer and astronomer, A.D. 139]: pert. to Ptolemy, or to his system of astronomy

PTOLEMAIC SYSTEM, *n.* the system of Astronomy named from Ptolemy (q.v.), its chief expounder; though it originated long before his time, and was, in fact, merely an attempt to reduce to scientific form the common and primitive notions concerning the motions of the heavenly bodies. It was [illegible] by Plato, Aristotle, Hipparchus, and (with the exception of the Pythagoreans, and probably of Pythagoras himself) all the eminent physicists and philosophers of ancient times; passing from them to the Byzantines and Arabs, who, especially the latter, were the means of disseminating it through w. Europe, where it continued the universally established doctrine till the 16th c. The primary and fundamental doctrines of this system are that the earth is the centre of the universe, and that the heavenly bodies revolve round it in circles, and at uniform rate. These notions, naturally suggested by the first general aspect of things, having previous to any accurate observation established themselves as unquestionable axioms, phenomena [illegible] inconsistent with them were explained by introduction of additional hypotheses. The belief that the earth is the centre of the universe was supported by its being in accordance with the position of the primary elements of which the material world was deemed to be composed. Thus, earth, the most stable of the elements, held the lowest place, and supported water, the second in order; above water was placed air, and then fire, either being supposed to extend indefinitely above the others. In or beyond the fire were the concentric zones or heavens, each heaven containing a transparent crystalline spherical shell, the smallest inclosing the earth and its superincumbent elements, and the larger spheres inclosing the smaller. To each of these spheres was attached a heavenly body, either, by the revolution of the crystalline, was made to move round the earth. The first or innermost sphere was that of the moon, and after it in order came those of Mercury, Venus, the Sun, Mars, Jupiter, Saturn, and the fixed stars, *eight* in all. To this system, later astronomers added a *ninth* sphere, the motion of which should produce the Precession (q.v.) of the Equinoxes, and a *tenth*, to cause the alternation of day and night. This tenth sphere, or *primum mobile*, was supposed to revolve from e. to w. in 24 hours, and to carry the others with it in its motion; but the Ptolemaic astronomers did not venture to explain how this was done, though since the axis of motion of the *primum mobile* was that of the equator, its extremities being the poles of the heavens, while that of the ninth sphere was the axis of the ecliptic, some explanation was certainly necessary. As observations of the heavens increased in accuracy, it was found that the heavenly motions were apparently not uniform, and this was explained as follows: The acceleration of the sun on one side, and retardation on the other side, of his orbit, is only apparent, and results from the earth not being in the centre

of his sphere, C (see fig.), but at E, and consequently his motion appears to be slowest at P, and quickest at R. The alternate progression and regression of the planets was accounted for by supposing them to move, not directly with their crystallines, but in a small circle, whose centre was a fixed point in the crystalline, and which revolved on its axis as it was carried round with the latter; thus (fig.) the planet was carried round the small circle ABD, as that circle was carried round PQR (now supposed to represent the planetary crystalline). The planet, while in the outer portion of its small circle, would thus have a forward, and in the inner portion a backward, motion. The larger circle was called an *eccentric*, and the smaller an *epicycle*. This theory of eccen-



tries and epicycles satisfied the early astronomers; but further investigation showed its incompleteness; and in later times it was found necessary to explain newly discovered discrepancies by heaping epicycle on epicycle, till hopeless complication of the system had been produced. As soon as astronomers came to understand and test the *Copernican* (q.v.) *theory*, the venerable and disorderly pile of hypotheses, the then representative of the P. S., which had received the papal seal of infallibility, and had in various forms held supreme sway over the minds of men for twenty centuries, at once crumbled to atoms, and sank into oblivion.

PTOLEMA'IS: see ACRE.

PTOLEMY, *tŏl ē-mĭ*, I. (surnamed SOTER, Preserver), King of Egypt, of the Macedonian dynasty: prob. abt. B.C. 367–283 (reigned B.C. 323–285); son of Lagus; but believed by some to be the son of Philip of Macedon, because his mother, Arsinoë, had been a concubine of that king, P.'s father being a Macedonian of humble station. P. acted as one of Alexander's generals in his eastern campaigns; and when the possessions of the great conqueror were divided, after his death at Babylon B.C. 323, Egypt fell to the lot of the son of Lagus. Troubles soon followed such an acquisition; but P. was a man of energy and valor, and not only protected his own realm, but also extended his dominions by the addition of Phœnicia and Cœle-Syria, capturing Jerusalem, too (probably in this expedition), by assaulting it on the

Jewish Sabbath. B.C. 316, war again broke out between P., Lysimachus, and Cassander on the one hand, and Antigonus on the other (see these titles). It lasted till B.C. 301; and at its conclusion P. was left in possession of almost the same territory as at its commencement, except of Cyprus, which, by the naval battle off Salamis in that island B.C. 306, was gained by Antigonus. P., however, recovered Cyprus B.C. 295, and it was thereafter attached to the Egyptian kingdom. After this battle of Salamis, Antigonus assumed the title King, which example P. and the other successors of Alexander followed. B.C. 305, P. compelled Demetrius, valiant son of Antigonus, to raise the siege of Rhodes, for which deliverance the Rhodians were so grateful that they worshipped him as a deity, and conferred on him the title *Soter*, Preserver. The latter part of his reign was peace. He governed his kingdom with an enlightened and vigorous policy, laying the foundation of prosperity in Egypt for generations. He encouraged commerce, made Alexandria the great mart of the Mediterranean, fostered literature, science, and art, founded the famous museum and library of Alexandria; and entertained at his court the votaries of the Muses: Euclid the geometrician; Stilpo the philosopher; Philetas the elegiac poet; Zenodotus the grammarian; Antiphilus and Apelles the painters; with many others. The history of Alexander's wars, by P., is the basis of Arrian's work on the same subject. Two years before his death, he abdicated in favor of his son Ptolemy Philadelphus.

PTOLEMY II. (surnamed PHILADELPHUS), King of Egypt, of the Macedonian dynasty: B.C. 309–247 reigned B.C. 285–247; b. in the island of Cos; son of Ptolemy I. and Berenice. His reign is remarkable for successful cultivation of the arts of peace. Excepting a contest with his half-brother, Magas, for the province of Cyrene, his wars against Syria are almost the only military exploits which interfered with those designs for improvement of his kingdom which have rendered his name famous among enlightened sovereigns. He carried on, with increased zeal, the good work which his father had begun. He enriched the library of Alexandria with all literary treasures of his own and of earlier times, and the museum was thronged with the learned from all countries—with such men as Theocritus and Philetas, poets; Euclid, geometrician; Aristarchus and Aratus, astronomers; Theodorus and Hegesias, philosophers; and many more. Tradition alleges that, by his orders, the Hebrew Scriptures were translated into Greek, and the version called the 'Septuagint' (q.v.) thus formed. He induced Manetho to write, in Greek, a political history of Egypt, and an account of the religious tenets of the Egyptians. He encouraged the study of natural history; and to facilitate the pursuits of those who devoted themselves to it, he formed a collection of rare and curious animals in the preserves. He founded many colonies in parts of his empire which seemed specially

suited to become centres of trade and of enlightenment, and thus spread more widely the seeds of civilization and Greek culture; among these places was Ptolemais (Acre) in Palestine. He ruled over Egypt, Phœnicia and Cœle-Syria, Lycia, Caria, Cyprus, and the Cyclades, with parts of Arabia, Libya, and Ethiopia. His son Ptolemy married Berenice, daughter of Magas, and the province of Cyrene was thus peacefully brought back to his empire. Under P. Philadelphus, Egypt rose to high rank among nations in power and in wealth. The surname Philadelphus was assumed by P. to indicate his great affection for his sister Arsinoë (q.v.), a woman of great beauty and much force of character, whom he married, according to Egyptian notions, after the death of her husband, Lysimachus. His former wife, Arsinoë, daughter of Lysimachus, was banished by him; and two of his brothers were put to death: some have explained the name Philadelphus as in irony referring to this. By his first wife, he had two sons, Ptolemy, his successor, and Lysimachus; and one daughter, Berenice, married to Antiochus II., King of Syria.

PTOLEMY III. (surnamed EUERGETES), King of Egypt, of the Macedonian dynasty: d. B.C. 222 (reigned B.C. 247–222); son of Ptolemy Philadelphus, whom he succeeded. He made war on the kingdom of Syria, to avenge the death of his sister Berenice, who had been murdered at the instigation of Laodice, former wife of Antiochus. He overran all the provinces as far s. as Babylon and Susa; those on the n. and e., as far as Bactria and India, offered him homage; and he might have extended the bounds of his empire much further, had not domestic troubles compelled him to hasten back to Egypt. The treasures that he brought with him were immense; and among the things most highly prized were the statues of the Egyptian gods which Cambyses had carried off to Babylon B.C. 525. It was the restoration of these to their proper temples which gained for P. the title of Euergetes (the Benefactor). His fleets gained many possessions on the coast of the Mediterranean, such as Pamphylia, Cilicia, and Ionia, which remained long subject to Egypt, though the e. provinces recently conquered soon returned to their former sovereign. He pushed the limits of the home-empire southward by conquering part of Ethiopia, where he formed a colony and centre of trade at Adulé. P., like his predecessors, patronized learned men, and encouraged the arts and sciences. He added so largely to the library of Alexandria that he has by some been called its founder. Among celebrated men who adorned his court, and kept up the fame of the 'Museum,' were Apollonius Rhodius, Eratosthenes, and Aristophanes the grammarian. In his reign, the Egyptian kingdom touched for a moment the highest point of military glory, prosperity, and wealth.

PTOLEMY IV. (surnamed Philopator), King of Egypt, of the Macedonian dynasty: d. B.C. 205 (reigned B.C. 222–205); son of Ptolemy Euergetes, whom he succeeded. His ignoble reign began in blood by the murder of his mother, Berenice, his brother Magas, and his uncle Lysimachus; and it ended in blood by the violent death of his wife, Arsinoë. He abandoned himself to debauchery, and intrusted the management of his kingdom to favorites. Antiochus, King of Syria, profiting by his indolence, wrested from him in war some of the provinces which his father had gained; but P., at length roused from his lethargy, took the field in person and defeated Antiochus at the battle of Raphia. When peace was concluded, P. returned to his capital, and plunged with increased zest into every vice and indulgence, hastening his death by his excesses. He followed the example of his father and grandfather in patronizing arts and letters; and cultivated friendship with the Romans, to whom he sent large supplies of grain during the second Punic war, but persecuted the Jews, against whom he had conceived a hatred in consequence of being refused admittance to the sanctuary at Jerusalem by the high-priest.

PTOLEMY V. (surnamed Epiphanes), King of Egypt, of the Macedonian dynasty: d. B.C. 181 (reigned B.C. 205–181); son and successor (at the age of only five years) of Ptolemy Philopator. His dominions were invaded by Antiochus, King of Syria, and Philip, King of Macedonia, while he was still an infant, and several provinces were severed from the Egyptian kingdom; but the Romans at length interfered, and peace was concluded, it being arranged that P. should marry Cleopatra I., daughter of Antiochus, and receive as her dowry those parts of his empire in Syria which had been taken from him. He was declared of age B.C. 196, and his coronation was performed with unusual splendor. The decree published on this occasion is that which forms the inscription on the far-famed Rosetta (*q.v.*) Stone. P. married Cleopatra I. B.C. 193–2; but the dowry was not delivered. The affairs of the kingdom were managed by the wise and virtuous Aristomenes, and so long as P. followed his counsels, all went well. But the king's ear was gradually opened to insinuations against his great minister, whom he ultimately compelled to drink poison. While P. was preparing for an expedition against Syria, he was poisoned by some of his followers, whom he had alarmed for their own safety. Under him, Egypt rapidly sank in prosperity, power, and reputation: indeed, Egypt came fully under the protectorate, and so under the rule of Rome.

PTOLEMY VI. (surnamed PHILOMETOR), King of Egypt, of the Macedonian dynasty: d. B.C. 146 (reigned B.C. 181–146); son and successor (when very young) of Ptolemy Epiphanes. The affairs of the kingdom were at first directed by his mother, Cleopatra I., who acted with prudence and energy. When she died, B.C. 173, the administration fell into the hands of two worthless ministers, Eulæus and Lenæus, who, engaging in war with Antiochus, brought the kingdom to the brink of ruin. The young king was taken prisoner by Antiochus (B.C. 170), who hoped to obtain possession of the whole of Egypt; but his younger brother, also called Ptolemy, immediately declared himself sovereign under the title Euergetes II., and took vigorous measures to defend the kingdom. By intervention of the Romans, Antiochus was compelled to return to his kingdom. The brothers reigned jointly for some time, but at length quarrelled, and a civil war ensued in which Euergetes II. was ultimately worsted. The deputies of the Roman senate, who now held Egypt entirely in their hands, arranged that P. Philometor should retain Egypt proper, while Euergetes II. should obtain Cyrene as a separate sovereignty. This settlement substantially held during the lifetime of P., who died from injuries received by a fall from his horse in a battle which he won against the Syrian usurper Alexander Balas. He is notable for his mild and humane disposition, strikingly evinced in his magnanimous treatment of his unworthy brother.

PTOLEMY VII., or EUERGETES II. (known by the nickname PHYSCON, Fat-paunch), King of Egypt, of the Macedonian dynasty: d. B.C. 117 (reigned B.C. 146–117); second son of Ptolemy Epiphanes; successor of his brother Ptolemy Philometor. He married his brother's sister and widow, Cleopatra II. (who was also his own sister), and on the same day murdered her infant son, P. Eupator, whom she had at first declared king. The history of the reign of this worst of all the Ptolemies is one unbroken record of crime and blood, whence his subjects nicknamed him *Kakergetes* ('the malefactor'). Not only relatives who stood in his way to the throne, but those who opposed his accession, and even persons aside from the dispute, were butchered with savage cruelty. His private vices and debaucheries were equally infamous. He divorced his wife and sister Cleopatra to marry her daughter by her first husband—his own brother; and when temporarily driven from his throne, B.C. 130–127, by the indignation of his subjects, who chose the divorced Cleopatra in his stead, the monster took diabolical revenge by murdering his own and Cleopatra's son, and sending the head and hands as a present to the latter on her birthday. One is almost ashamed to add that he retained the hereditary taste for learning, patronized learned men, and wrote a work of 24 books, called *Memoirs* (*Hypomnēmata*).

Several other Ptolemies of this dynasty followed; but they were mostly of little note.

PTOLEMY (CLAUDIUS PTOLEMÆUS): celebrated ancient astronomer and geographer: b. Egypt, though it is uncertain whether at Pelusium or at Ptolemais in the Thebaid. Nothing is known of his personal history, except that he made astronomical observations in Alexandria A.D. 139 (first recorded observation 127, last recorded 151); and there is probable evidence of his having been alive 161. The chief of his writings are: *Megalē Syntaxis tēs Astronomias*, which, to distinguish it from the next mentioned, was probably denominated by the Arabs *megisté*, the greatest, whence the name *Almagest* [Ar. article *al*, the], by which it is generally known; *Tetrabiblos Syntaxis*, with which is combined another work, called *Karpos* or *Centiloquium*, from its containing a hundred aphorisms, both works treating of astrological subjects, and therefore held by some to be of doubtful genuineness: *Pasēs aplanōn asterōn kai synagōgē epismasiōn*, treatise on the phenomena of the fixed stars, or a species of almanac: the *Geographikē Hyphēgēsis*, P.'s great geographical work, in eight books. The rest of his works are of inferior importance, and consist of descriptions of various kinds of Projections (q.v.), the theory of the musical scale, chronological and metaphysical treatises and a summary of the hypotheses employed in his great work, the *Almagest*. Others of P.'s works have been lost; and it is doubtful whether or not they contained a treatise on Optics, as a Latin version of what is said to have been an Arabic translation of P.'s original treatise on that subject is still in existence.

P., both as an astronomer and as a geographer, held supreme sway over the minds of almost all scientific men from his own time till about the 15th c.; but he seems to have been—especially in astronomy—not so much an independent investigator as a corrector and improver of the work of his predecessors. In astronomy, he had the labors of Hipparchus to guide him; and, indeed, scrupulously distinguishes between Hipparchus's labors and his own. To P. belong the invention of a planetary theory, the discovery of the moon's Evection (q.v.), and the singular distinction of being the sole existing authority on ancient astronomy. From this last-mentioned fact, the system of astronomy which he sets forth in the *Almagest* received his name: and, as the *Ptolemaic System* (q.v.), obtained the homage of succeeding generations till the time of Copernicus. His great work, the *Almagest*, is divided into 13 books. P. seems to have been little of an independent observer, trusting implicitly to his predecessor, Hipparchus: but his geometrical powers were of very high order, unless, as Delambre suggests, but with little probability, the elegant demonstrations here and there occurring in the *Almagest* were borrowed from other sources.

As a geographer, P. occupies a similar position: he appears before his readers as the corrector and improver of the works of a predecessor, Marinus of Tyre, about whom, except from P.'s writings, little is known. P.

here appears to more advantage as an independent investigator, and his improvements and suggestions are at once more valuable and correct; but it is sometimes difficult to separate his data from those of Marinus. His geography is divided into eight books, all of which, except the 1st, 8th, and a portion of the 7th, are merely a catalogue of places, with their latitude and longitude (to 12ths of a degree), with a brief general description prefixed to each continent and country or tribe, and interspersed here and there with remarks of a miscellaneous character on any point of interest. The rest of the work contains details regarding his mode of noting the positions of places—by latitude (*mēkos*) and longitude (*platos*)—with the calculation of the size of the sphere of the earth, and of the extent of surface then known. He also describes the mode adopted by him of projecting the surface of a hemisphere on a flat surface, and shows its superiority over the projections of Eratosthenes, Hipparchus, and Marinus. He also constructed a series of 26 maps, with a general map of the world, in illustration of his work.

The *Almagest* and the *Geography* were the standard text-books to succeeding ages, the first till the time of Copernicus, the second till the great maritime discoveries of the 15th c. showed its deficiencies. They have passed through numerous editions, the best of which are, for the *Almagest* and the most of P.'s minor works, that by Halma (Paris 1813,16,19,20, quarto); and for the *Geography*, the Latin versions of 1482 and 90, published at Rome, the *editio princeps* of the Greek text by Erasmus (1533), the Elzevir ed. (1619), and those of Wilberg and Grashof (1844), and Nobbe (1845). The catalogue of stars has been frequently reprinted separately, the best ed. being that of Francis Baily, in the *Memoirs of the Royal Astronomical Society*, XIII. (1843).

PTOMAINE, *tō mā-in* or *-ēn* [Gr. *ptoma*, fallen tree, etc., corpse, and ending *-ine*]: alkaloid product of putrefaction of dead animal or vegetable tissues; also a similar product developed by pathogenic bacteria from living tissues. Organisms that grow on, or prey on, dead or decaying matter are called 'saprophytes;' those that prey on living tissues are known as 'pathogenic organisms.' No absolute line of demarkation can be drawn between the two; indeed, some pathogenic organisms may, like the saprophytic, find a pabulum in matter that is dead or decaying; and saprophytes, in turn, may prey on living tissues. Also, there are some organisms which, though existing in the system, give rise to no pathological condition. But when a pathogenic organism gets lodgment in the tissues or blood of man or animal, and there finds fit pabulum for its growth and development, the elements of those tissues are broken up, and the product is a P., which, absorbed into the blood, may poison it: 'ptomaine poisoning.'

PTOSIS, n. *tō'sĭs* [Gr. *ptōsis*, a falling -from *piptō*, I fall]: a drooping or falling of the upper eyelid, which arises from palsy of the third or *motor oculi* nerve. The patient can open his eye only by means of his fingers. P. may arise either from debility, in which case it may be removed by tonics; or from congestion of the brain, when it is usually accompanied with giddiness, headache, etc., and should be removed by [illegible] purgatives, and low diet; or from organic disease of the brain, in which case remedies are of little use. If it occurs without any apparent cause, and resists medical treatment, it may be removed by a surgical operation, by which the eyelid is brought under the action of the [illegible] muscle, which receives its nervous power from another source.

PTYALISM, n. *tī'ăl-ĭzm* [Gr. *ptŭălis'mos*, a spitting—from *ptu'ălŏn*, spittle; *ptuō*, I spit]: in *med.*, an excessive flow of saliva. PTYALIN, n. *tī'ăl-ĭn*, in herbivorous and mixed-eating animals, a peculiar nitrogenous substance, obtained from saliva, which has the property of converting starch into a kind of sugar.

PTYALOGOGUES, n. plu. *tī-ăl'ō-gŏgz* [Gr. *ptu'ălŏn*, spittle; *agōgŏs*, leading]: medicines that promote discharges of saliva; also PTYSMAGOGUE, n. *tĭz'mă-gŏg* [Gr. *ptusma*, saliva; *agōgŏs*, driving], in the same sense.

PTYCHOCERAS, n. *tī-kŏs'ĕr-ăs*, or PTYCHOCERATITE, n. *tī'kō-sĕr'ă-tīt* [Gr. *ptuchē*, a fold; *keras*, a horn, *keratos*, of a horn]: in *geol.*, a genus of chambered cells of the ammonite family, peculiar to the cretaceous formation —so named from the shell being folded upon itself.

PTYCHODUS, *tī'kō-dŭs*: genus of cretaceous fish, founded on large, square, crushing teeth, which occur in considerable quantity in the Chalk beds. The crown of the teeth is raised in the centre into a number of parallel transverse ridges, and the flat margin is finely granulated. They were set, as in the Port Jackson shark, like a pavement on the borders of the mouth, and were admirably adapted to crush the shells of the crustacea and mollusca on which they fed. Large dorsal spines have been found associated with the teeth; but as no materials exist for restoration of the external form of the fish, the analogy of their modern representative, the Port Jackson shark, alone suggests that they belonged to the Ptychodus.

PTYSMAGOGUE: see under PTYALOGOGUES.

PUBERTY, n. *pū bĕr-tī* [F. *puberté*—from L. *pūbertas*, the age of maturity—from *pūbēs*, the ripe age: It. *pubertà*]: the age at which persons are capable of begetting or bearing children; maturity; in *law*, the age of 14 years in boys, and of 12 in girls. PUBERAL, a. *pū bĕr-ăl*, belonging to puberty.

PUBERTY: stage of physical development or period of life in the human individual when the person becomes capable of sexual function. The age of P. differs accord-

ing to race and according to latitude or climate: it is later usually in temperate climates than in either very warm or very cold countries. The age of P. of white persons in the United States is 14–16 years for males, and 12–14 for females, with frequent exceptions, in which the age for females is as low as 11 years. The age of P. is earlier in negroes, though many generations removed from Africa, than in whites. The secondary physical changes that attend P. in the male individual are a more complete development of the larynx, deepening of the voice, growth of the beard, etc. In the female there is a development of the mammary glands, the catamenial process begins, the contours of the body become rounded, etc. The moral and mental character of the individual also reaches a crisis at this period.

PUBESCENCE: see under PUBIS.

PUBIS, n. *pū'bĭs* [L. *pūbēs*, the signs of puberty—viz., the growth of the hair]: in *anat.*, the share-bone; one of the bones which enter into the composition of the pelvic arch of vertebrates. PUBES, n. *pū'bēz*, the middle part of the hypogastric region; the external part where the generative organs are situated; the down of plants. PUBIC, a. *pū'bĭk*, of or connected with the *pubes*. PUBESCENT, a. *pū-bĕs'ĕnt* [L. *pubescens* or *pubescentem*, reaching the age of puberty, ripening; *pubesco*, I ripen]: arriving at maturity; in *bot.*, covered with soft hair or down. PUBES'CENCE, n. *-ĕns*, state of puberty; in *bot.*, the downy substance on plants. *Note.*—Although *pubes* is the correct Latin nominative, and *pubis* the genitive, late Latin authors have written *pubis* for *pubes*, and accordingly we now find both used in the nominative.

PUBLIC, a. *pŭb'lĭk* [F. *public*—from L. *pub licus*, common, public—from *pop'ŭlus*, the people, the multitude: It. *pubblico*]: pert. to a state or community; extending to a whole people; not private; common; open to all: N. the people at large; the many; the people indefinitely. PUBLICAN, n. *pŭb'lĭ-kăn* [F. *publicain*—from L. *pŭb licānus*, a farmer of the revenue]: one who keeps a house for sale of beer and spirits: in *anc. Rome*, a tax-collector; one who farmed the public taxes (see PUBLICANUS). PUB'LICLY, ad. *-lĭ*. PUBLICITY, n. *pŭb-lĭs'ĭ-tĭ* [F. *publicité*]: state of being open to the knowledge of the public. PUBLICIST, n. *pŭb'lĭ-sĭst*, one skilled in the laws and rights of nations; a writer thereon. PUBLIC-SPIRITED, a. dictated by anxiety for the public good. PUBLIC-SPIRITEDNESS, n. disposition to advance the public good. PUBLIC BURDENS, in *Scotch law*, usual taxes on land. PUBLIC-HOUSE, common inn or tavern. PUBLIC LAW, the law of nations. PUBLIC WORKS, usually, any great works being constructed for public use, as railways, docks, etc.; strictly, works constructed by engineers for the public and at the public cost. IN PUBLIC, before the public at large; in open view; not in secret. PUBLICATION: see under PUBLISH.—SYN. of 'public': open; notorious; general; common.

PUBLICANUS, *pŭb-li-kā'nŭs:* name among the anc. Romans for one of that class of persons who farmed the public revenues (*vectigalia*). These revenues were put up to auction by the censors, and were 'sold' for a period of five years. They were derived chiefly from tolls, tithes, and harbor-duties, *scriptura* (tax for the use of public pasture-lands), mining and salt duties. As the state required the publicani to give security for the sum at which they had purchased the collecting of the taxes, and as this sum was usually much greater than the wealth of any single individual, companies (*societates*) were formed, the members of which took each so many shares and were thus enabled to carry on enterprises far beyond the capabilities of the separate shareholders. Their contract with the Roman govt. was made in the name of a single person, who was called *manceps*, and who was held responsible for his *socii* to the state. Every *societas* had also a head manager (*magister*), who resided at Rome, and transacted all foreign correspondence with the inferior officers who directly superintended the collection of taxes. In general, a societas farmed only one branch of the revenue, but exceptions occurred. Only Roman citizens were eligible as publicani, and of course only the wealthiest among these. After the middle of B.C. 2d c., the farming of the public revenues fell into the hands chiefly of the Equites (q.v.). By a wise regulation, no gov. of a Roman province was allowed, during the period of his governorship, to have anything to do with these tax-gathering companies. The design of this was to place the gov. in such a position that he could afford to act justly toward the people, who were often cruelly oppressed by the exactions of the provincial underlings—the 'publicans' of the New Testament.

PUBLIC DOMAIN OF THE UNITED STATES: lands owned by the U. S. govt. in trust for the people. The area of public lands in the states and territories 1890, June 30, was approximately 1,815,504,147 acres=2,836,725 sq. m.), of which 986,084,675 acres had been surveyed and 1,829,419,472 were unsurveyed. The vacant land comprised 282,772,439 acres surveyed and 303,444,422 unsurveyed, total 586,216,861. See HOMESTEAD ENTRY.

The first table on following page shows the location of the surveyed and unsurveyed public lands, according to the report of the General Land Office, for the fiscal year ending 1894, June 30; and the second the vacant lands in the public land states and territories at above date. The first table includes Indian and other public reservations, several bodies of private land claims, public school reservations, railway and other grants, and mountain, lake, and river areas. The second table excludes Alaska, military, Indian, reservoir site, and timber reservations, and unadjusted railway grants and claims.

State and Territory.	Acres Surveyed.	Acres Unsurveyed.	Total Acres.
Alabama	32,462,115	.....	32,462,115
Arkansas	33,440,063	.....	33,440,063
California	73,040,731	27,951,909	100,992,640
Colorado	61,180,885	5,699,115	66,880,000
Florida	30,830,657	7,100,863	37,931,520
Idaho	12,550,051	42,678,109	55,228,160
Illinois	35,465,063	.....	35,465,063
Indiana	21,637,760	.....	21,637,760
Iowa	35,228,800	.....	35,228,800
Kansas	51,770,240	.....	51,770,240
Louisiana	27,166,464	1,564,626	28,731,090
Michigan	36,128,640	.....	36,128,640
Minnesota	45,362,018	8,097,822	53,459,840
Mississippi	30,179,840	.....	30,179,840
Missouri	41,836,931	.....	41,836,931
Montana	24,698,529	67,318,111	92,016,640
Nebraska	47,256,537	212,263	47,468,800
Nevada	34,699,263	37,038,337	71,737,600
North Dakota	29,306,367	16,255,233	25,561,600
Ohio	25,581,976	.....	45,581,976
Oregon	42,317,420	18,657,940	60,975,360
South Dakota	36,272,040	14,271,160	50,643,200
Washington	23,376,845	21,419,315	44,796,160
Wisconsin	34,511,360	.....	34,511,360
Wyoming	50,314,648	12,330,472	62,645,120
Alaska	598	369,529,002	369,529,600
Arizona	15,715,872	57,190,368	72,906,240
Indian Territory	10,800,640	8,774,400	19,575,040
New Mexico	49,752,548	27,816,092	77,568,640
Oklahoma	24,453,600	46,080	24,499,680
Utah	15,411,377	38,653,263	54,064,640
Total	1,032,719,908	782,704,480	1,815,424,388

State and Territory.	Acres Surveyed.	Acres Unsurveyed.	Total Acres.
Alabama	805,002	.....	805,002
Arizona	10,492,469	45,214,755	55,707,224
Arkansas	4,632,278	.....	4,632,278
California	38,327,545	13,698,286	52,025,831
Colorado	36,220,651	4,630,973	40,851,624
Florida	1,845,815	164,810	2,010,625
Idaho	7,841,060	39,132,419	46 973,479
Kansas	846,997	.....	846.997
Louisiana	997,405	65,016	1,062,421
Michigan	630,781	.....	630,781
Minnesota	2,595,208	3,028,270	5,623,478
Mississippi	836,417	.....	836,417
Missouri	896,113	.....	896,113
Montana	14,595,826	58,169,481	72,765,307
Nebraska	10,899,036	121,600	11,020,636
Nevada	30,869,879	22,044,756	52,914,635
New Mexico	42,258,882	15,524,908	57,783,790
North Dakota	10,856,316	11,926,508	22,782,824
Oklahoma	7,092,888	403,200	7,496,088
Oregon	24,742,145	13,498,207	38,240,352
South Dakota	9,152,666	5,380,208	14,532,874
Utah	9,360,094	32,196,161	41,556,255
Washington	5,131,956	13,848,341	18,980,297
Wisconsin	668,813	.....	668,813
Wyoming	41,967,995	12,428,177	54,396,172
Total	314,564,238	291,476,076	606,040,314

PUB'LIC HEALTH: see HEALTH: SANITARY SCIENCE.

PUB'LIC-HOUSES, in England: houses of public resort in which the chief business is the sale of beer or other liquors. They are in two classes—Ale-houses, called also Inns (q.v.), and Beer-houses. The former give board and lodging to travellers, while the latter are mere shops for the sale of beer to be consumed on or off the premises (see BEER ACTS).

In the United States the term is little used, but is found in various statutes. The laws regulating such houses in detail vary in different states. The houses are under a variety of restrictions also as to sale of liquor. See LICENSE: LOCAL OPTION: PROHIBITION: TEMPERANCE: HOTEL.

PUBLICO'LA, *pub-lik'ō-li*, PUBLIUS VALERIUS: one of the founders of the Roman republic, in B.C. 6th c.; lawgiver and consul. He received the surname *Publicola* ('the people's friend') because of the laws that he formulated and promulgated in the interest of the common people. He was three consuls—B.C. 509 (with Brutus) and B.C. 508, 504; was active in expulsion of the Tarquins, and fought against Porsena, who attempted to restore the Tarquins; routed the Sabines; was given a triumph on returning to Rome; and is supposed to have been killed at the battle of Regillus, B.C. 496. It is said that through fear that the people might think that he designed assuming imperial powers, after his success against the enemies of Rome, he ordered the demolition of an elegant palace that he had begun on the Velian hill, near the forum.

PUB'LIC PROS'ECUTOR: see PROSECUTOR.

PUB'LIC SCHOOLS: see SCHOOLS: EDUCATION, NATIONAL OR STATE.

PUBLILIUS, *pub-lil'i-ŭs* less correctly PUBLIUS, *pub'li-ŭs*, SYRUS: mimic poet: b. Syria; wrote about B.C. 44. He was taken to Italy as a slave when a boy; was sold to Domitius, a Roman patrician, who, pleased with his wit, educated him and gave him his freedom when of age. Soon afterward P. distinguished himself as a writer of mimes, or burlesque plays. He travelled, and acted in his own plays; was very highly esteemed by Julius Cæsar and Cicero; and received from the first the prize for a histrionic contest, in which he vanquished all his competitors, including the poet Laberius, whose burlesque compositions were in general esteem. His only writings extant are about 700 iambic and trochaic verses, arranged alphabetically by initial letters, and comprising a collection of moral maxims, last pub. 1880 under the title *Sentences*.

PUBLISH, v. *pŭb'lish* [F. *publier*—from L. *publicārĕ*, to make common, to publish: Sp. *publicar*, to publish (see PUBLIC)]: to make known to all what before was private or unknown; to announce publicly in a formal manner; to proclaim; to reveal, as a secret; to print and offer for sale.—applied chiefly to printed books, engravings, etc. PUB'LISHING, imp.: N. the act of making public. PUB'LISHED, pp. *-lĭsht*. PUB'LISHER, n. *-ĕr*, one who, as the first source of supply, issues books and other literary works for sale. PUB'LICA'TION, n. *-lĭ-kā'-shŭn* [F.—L.]: the act of making public: the act of first issuing a book or literary work; a book or other literary work printed and offered for sale.—SYN. of 'publish': to announce; divulge; advertise; proclaim; declare; promulgate; disclose; reveal; issue; emit; utter; discover.

PUCCINIA, *pŭk-sĭn'ĭ-a* or *pŭk-sĭ'nĭ-a*: genus of fungi, of the division *Coniomycetes*, all very small and parasitic, on the leaves or stems of plants, within the tissue of which the mycelium creeps. One of the most common species, and the most important, is CORN MILDEW (*P. graminis*), often present in grain-fields, and in some years very injurious to wheat and other cereal crops. It is a remarkable example of a supposed superstition verified by science; for it is communicated to grain from barberry bushes, as long supposed. It exists in its spring stage as cluster-cups, or rust, on barberry leaves, where it formerly received the name *Æcidium berberidis*. In a later stage, it appears as a white or yellowish rust on grain, spreading and becoming orange-red. In its third stage, in the autumn, it produces black spores, called black rust. Hundreds of species of P. are known, many of them injurious to crops.

PUCCOON, n. *pŭk'ôn* [Indian name]: the *Sanguinărĭă Canaden'sis*, or blood-root, ord. *Papāverācĕæ*; plant whose root yields a deep orange-red fluid, used by the Indians of N. America.—P. is a name also for a plant of the Borage family, genus *Lithospermum*, including the roadside Corn and Common Gromwells (*L. arvense* and *L. officinale*), naturalized from Europe; the native narrow-leaved and broad-leaved—all except *L. arvense* with smooth nutlets, and all with whitish flowers; the Hairy P. (*L. hirtum*), with bristly hairs, and the Hoary P., or Alkanet (*L. canescens*), both with showy orange flowers, and roots that yield a red dye; also the orange long-flowered ($\frac{3}{5}$ to $1\frac{1}{2}$ in. long) species of the western prairies and plains.

PUCE, a. *pūs* [F. *puce*, brown-colored; *puce*, a flea—from L. *pūlex* or *pūlicem*, a flea]: of a dark-brown or brownish-purple color: N. a dark-brownish purple.

PUCELLAS, n. *pū-sĕl'lăs*: a glass-maker's tool, resembling a pair of spring sugar-tongs, the prongs resembling the cutting parts of a pair of shears, but blunt.

PUCERON, n. *pū'sĕr-ŏn* [F. *puceron*, a grub—from *puce*, a flea]: the plant-louse; the aphis or vine-fretter.

PUCK, n. *pŭk* [Icel. *puki*, the evil spirit: W. *pwca*, a hobgoblin: Gael. *bucan*, a sprite, a goblin: Ger. *spuk*, a spectre, hobgoblin.]: name of an elf in Shakespeare; a demon; a mischievous spirit.

PUCKA, a. *pŭk'a* [Hind. *pakka*, ripe, ready]: substantial; permanent; genuine; unmistakable: see under CUTCHA.

PUCKER, v. *pŭk'ĕr* [F. *poche*, a pocket, a pucker: Ir. *pucadh*, a swelling]: to gather into small disorderly folds or wrinkles, applied to cloth; to rumple: N. a fold or wrinkle; a collection of folds. PUCK'ERING, imp. PUCKERED, pp. *-ĕrd*: ADJ. gathered in folds; wrinkled.

PUD, or POOD, *pôd*: Russian weight which contains 40 Russian lbs.—almost equivalent to 36 lbs. avoirdupois.

PUDDENING, n. *pŭd'ĕn-ing* [prob. from *pudding*]: in *naut.*, a thick wreath or gasket of matting or oakum, tapering toward the ends, and used as a fender: a braid of yarns.

PUDDING, n. *pŭd'ing* [F. *boudin*: W. *pobyn*: Gael. *putag*, a pudding: Low Ger. *pudding*: Dan. *pude*: Sw. *puta*]: flour or meal mixed with a variety of ingredients, and usually sweetened, cooked in a bag, case, or gut of an animal—a mode of preparation greatly used in England. Puddings are either made of dough simply boiled in a cloth or basin, and with or without other materials, or they may be made of a batter of flour, or other farinaceous material, and water, and poured into the pudding-cloth and boiled, or into a dish and baked. It is common also to make fruit and meat puddings, by rolling out dough or paste into large flat sheets, and inclosing the fruit or meat entirely in them, and then tying them up in the pudding-cloth and boiling them. Recipes for varying the details are innumerable. *Proverbially*, victuals. PUDDING-FACED, a. having a face which, from its roundness, smoothness, and fatness, is suggestive of a pudding. PUDDING-HEADED, a. stupid; having a head thick, round, and fat, suggestive of a pudding. PUDDING-PIE, pudding with meat baked in it. PUDDING-SLEEVE, the full sleeve of a clerical gown. PUDDING-STONE, a mass of water-worn flint pebbles cemented *pudding-like* by a siliceous paste; now generally known as Conglomerate (q.v.). PUDDING-TIME, time for dinner; very nick of time, in reference to the pudding having anciently been the first dish set upon the table.

PUDDLE, n. *pŭd'dl* [an imitative word like *paddle*, representing the sound of dabbling in the wet: Low Ger. *pladdern*, to dabble in the water: Dan. *pladdre*, to work up peat and water together]: a small pool of muddy water; stiff clay and sand worked together until water-tight: V. to make foul or muddy; to mix dirt and water; to make impervious to water by means of clay, as the embankment of a reservoir; to convert cast-iron into

wrought-iron by stirring it while at a red heat in a furnace until it adheres into a lump. PUD'DLING, imp. *-dling:* N. the process of converting cast into wrought iron (see IRON): process by which wells, ponds, canals, etc., are lined with clay or loam to render them impervious to water (see EMBANK.' PUD'DLED, pp. *-dld:* ADJ. made foul and turbid as a puddle: made water-tight by mud or clay. PUD'DLER, n. *-dlĕr*, one who works at the process of turning cast-iron into wrought-iron. PUD'DLY, a. *-dli*, consisting of or resembling puddles; muddy.

PUDENCY, n. *pū'dĕn-sĭ* [L. *pudens*, bashful]: extreme modesty.

PUDENDA, n. plu. *pū-dĕn'dă* [L. *puden'dus*, of which one ought to be ashamed]: the external organs or parts of generation.

PUDIC, a. *pū'dĭk*, or PUDICAL, a. *pū-dĭ-kăl* [L. *pudīcus*, bashful, modest—from *pudēre*, to be ashamed: It. *pudico:* F. *pudique*]: pert. to the pudenda or private parts. PUDICITY, n. *pū-dĭs'ĭ-tĭ* [L. *pudicitia*, modesty, chastity: F. *pudicité*]: modesty; chastity.

PUEBLA, *pwĕb'lă*, or, in full, LA PUEBLA DE ZARAGOZA: third city in pop. in Mexico and cap. of the state of P.; on a plateau 7,200 ft. above sea-level; 76 m. e.s.e. of Mexico City. It was formerly known as LA PUEBLA DE LOS ANGELES; but since 1862, May 5, when the Mexicans under Gen. Zaragoza won a great victory over the French on the neighboring heights, it has borne the name of the successful commander. P. is one of the most attractive and healthful cities in Mexico. It has preserved many of its ancient Spanish characteristics, conspicuous among which is the lavish use of richly colored glazed tiles for exterior and interior decoration of public and private buildings. There are over 125 churches and chapels; numerous monasteries, convents, schools, and charitable and benevolent institutions; and a large and 25 small plazas. The cathedral, second in size and grandeur only to that of Mexico City, is on the s. side of the main plaza, the other sides being occupied by stores. The interior of the cathedral is richly adorned with onyx and paintings, and the Hall of Bishops contains some old tapestries and portraits of the bishops who have sat therein during 350 years. P. has valuable marble and onyx mines in its vicinity, and is chiefly engaged in manufacturing cotton and woolen goods. It was founded as a mission 1532; captured by Iturbide 1821; occupied by Gen. Scott 1847; captured by the French 1863; and captured from them 1867. Pop. (1890) 78,530.

PUEBLO, *pwĕb'lō:* city, cap. of Pueblo co., Colo.; on the Arkansas river, and the Denver and Rio Grande, the Atchison Topeka and Santa Fé, the Denver Texas and Gulf, and the Missouri Pacific railroads; 118 m. s. of Denver. It is in an agricultural and stock-raising country, and is the largest manufacturing city in the state. Its chief industry is smelting, for which it possesses peculiar advantages of location, cheap transpor-

tation of ores on a down grade from Leadville and other sources of mineral supply, and ready access to the inexhaustible coal deposit of Trinidad, Canon City, and other fields still nearer, which is convertible into the finest coke. In 1888–9 it had 19 lead furnaces, with smelting capacity each of 40 tons of all classes and grades of ore, which paid for freightage, flux, and fuel $1,753,450, and yielded: gold 21,900 ounces, valued at $438,000; silver 5,475,000 ounces, valued at $5,310,750; and lead 27,375 tons, valued at $2,463,750. A single coke and iron company had capital $10,000,000, plant $2,000,000, employés 2,000, monthly pay-roll $150,000, value of year's output (including 120,000 tons of steel rails and 100,000 kegs of nails of all sizes) $5,000,000; and a single smelting company with 6 furnaces had a semi-annual output valued at $811,744. P. contained (1894) 39 churches representing 21 denominations; union depot (cost $300,000); board-of-trade building ($70,000); city hall ($50,000), opera-house ($225,000, seating capacity 5,000); new co. jail ($75,000); state fair-grounds ($10,000); machine-shops of the Missouri Pacific railroad ($750,000); college for young men; seminary for girls; excellent system of public schools, with 16 brick and stone buildings, and several private schools and academies; 6 national banks (cap. $1,000,000); 2 savings-banks (cap. $100,000); 3 daily, 6 weekly, and 1 monthly publications; gas and electric light plants; annual trade valued at $20,000,000; 8 hotels; several handsome boulevards and public parks; and State Asylum for the Insane. The city is supplied with water from the Arkansas river and from many mineral springs; has a well-equipped paid fire dept., improved system of sewerage, gas and electric light plants, street railroads, and streets 80 ft. wide; and at an elevation of 4,600 ft. has a climate rivalling that of Italy. In 1894 the assessed valuation was $9,874,895, and 1895, Feb., the total debt was $297,000. Pop. (1880) 3,217; (1885) 6,659; (1890) 24,588.

PUEBLO INDIANS, *pwěb lō in di-anz* [Sp. *pueblo*, settlement, people]: septs of aboriginals inhabiting communal dwellings and villages in N. Mex., and Ariz. The principal sept is that of the Zuñis: see ZUÑI INDIANS. The P. I. in N. Mex. number 8,278, inhabiting 20 villages; those in Ariz. number 1,326. The septs differ in language. The communal houses are sometimes several stories high, of stone or of adobe. The P. I. are agriculturists, growing grain, cotton, vegetables, and fruit by means of irrigation. They spin and weave cotton and wool fibres into blankets and other textile fabrics; they also practice the art of pottery. They are peaceable and industrious, preserving their ancient customs, social, civil, and religious, though nominally they are Christians. Each village is a commonwealth in itself, with gov. and council chosen in accordance with immemorial usage.

PUERILE, a. *pū'ėr-īl* or *-il* [F. *puéril*—from L. *pŭèrīlis*, childish—from *puer*, a boy: It. *puerile*]: pert. to a boy; childish; trifling; in *med.*, applied to an unnatural and morbid kind of breathing. PU'ERILELY, ad. *-li.* PU'ERIL'ITY, n. *-il'ī-ti* [F. *puérilité*—from L. *puerilĭtas*, childhood]: the quality of being puerile; the manner or actions of a boy; that which is trifling; childishness.—SYN. of 'puerile': youthful; boyish; trifling; childish; weak; juvenile; flat; insipid.

PUERPERAL, a. *pū-ėr'pėr-ăl* [It. *puerperale;* F. *puerpéral*, puerperal—from L. *pŭerpĕra*, a woman in childbed—from *puer*, a child, a boy; *parĭō*, I bring forth]: relating to or following child-birth; said of a fever coming after child-birth.

PUERPERAL FE'VER, *pū-ėr'pėr-ăl:* also called childbed fever: formerly defined as a specific fever peculiar to women during the period immediately following delivery; now known to be a septic fever (see SEPTICÆMIA: PYÆMIA) exactly analogous to similar conditions occurring after abortions and from infection in wounds. The term is retained, therefore, simply as a matter of convenience, and in the broadest sense includes slight elevations of temperature, due to retention of fæces (copræmia, intestinal toxæmia), to nervous reaction, to non-septic inflammation of the uterus and its appendages, or various accidental complications. The propriety of using the term in this broad sense is doubtful, and, as ordinarily understood, puerperal fever is a septic disease due to one or more of the many germs that cause putrefaction and suppuration, or to those of erysipelas, diphtheria, or, perhaps, of scarlet fever and other exanthemata.

P. F. formerly caused one-tenth or more of the total death-rate among women. It sometimes occurred in epidemics in which nearly all cases were fatal, while to save two-thirds of a series of cases, including mild forms, was considered good practice. The disease was especially fatal in maternity hospitals, the average mortality of various well-conducted institutions under older methods of treatment, being from 8 to 11 per cent. of all patients delivered. Dr. Oliver Wendell Holmes more than 50 years ago demonstrated the infectiousness of puerperal fever, and laid down rules for its avoidance, holding physicians who had repeated cases of it as morally responsible for murder. Semmelweis, of Vienna, in 1847, noticed that students going from the dissecting room to the maternity wards carried the infection, and he was the first to adopt antiseptic methods, requiring the cleansing of the hands in chlorine water before the examination of the parturient woman. He greatly reduced the mortality, even by this crude method. Since the development of antiseptic methods, puerperal fever has almost disappeared except in communities in which ignorant nurses or midwives are commonly employed. Every case now occurring must be regarded as theoretically preventable, and its cause must be sought in filth, ignorance, or neglect, or

in the previous existence of some septic inflammation of the generative organs.

The cardinal principles of prevention are as follows: 1. The avoidance of all contagion from diphtheria, erysipelas, septic fever, and the exanthemata, although the causative relation of the last is somewhat doubtful. 2. Perfect cleanliness in the garments, bedding, napkins, and cloths used by or about the patient. 3. The disinfection of the hands of the physician, nurse, or midwife, and of all instruments used within the parturient canal. 4. The use of antiseptic injections. The last are now used much less than formerly, and, by many, not at all unless there is some special reason to fear septic infection, as when the patient has gonorrhœa, or has been exposed to erysipelas, etc., or proper precautions as to cleanliness have been lacking. See ASEPSIS: ANTISEPTICS.

Puerperal fever usually begins between the third and the tenth day after delivery, and terminates in death after five or six days. But no arbitrary rules can be laid down, its development being possible as long as there are lacerations or unhealed areas in the parturient canal. Death may occur within a day or two after the appearance of symptoms, or it may be averted for two or three weeks, or, if prompt measures are taken, life may often be saved. The symptoms are fever, chill, rapid or very slow pulse, sometimes a rash resembling that of scarlet fever, sometimes a foul discharge—though fatal cases may be unattended by any odor or by more than the usual discharge—sometimes localized pain and edema of the lower extremity point to the formation of a septic thrombus of one of the larger veins. Usually the thrombosis occurs in the uterine veins, and is not attended by so clearly marked symptoms. It must be remembered that the disease is simply septicæmia or pyæmia, developing from infection through the parturient canal.

Treatment includes antiseptic irrigation of the uterus, scraping away retained and putrefying debris, emptying the bowels to remove intestinal toxæmia, and the general supporting treatment of pyæmia. Drugs which lower temperature should not be used as they mask the symptoms.

Many cases appearing like beginning puerperal fever are due merely to absorption of poisons from the bowel, and are immediately relieved by cathartics and enemata. Well developed puerperal fever is rarely treated successfully.

PUER'PERAL MA'NIA: mental derangement of many forms and degrees, to which women in child-bed are sometimes liable. In the experience of Esquirol, these forms presented the following proportions: of 92 cases, 49 exhibited symptoms of mania; 35, those of monomania; and 8, those of dementia. The points of agreement between these widely-differing moral phenomena are, that they occur during some stage of child-bearing, and that they can be traced to physical, though not necessarily common physical, causes. Insanity may be developed either during pregnancy, shortly after

parturition, or during nursing. Under whatever circumstances the malady may arise, it is one of exhaustion, debility, and prostration; and this is nearly equally true, whether it be characterized by depression, languor, and passiveness, or by extreme excitement and violence; though the latter are the features by which it is generally recognized, and which have justified the name by which it is generally known. The similarity to ordinary frenzy is great: there is the same watchfulness, fury, incoherence, the same vitiation of the secretions, and emaciation; and the chief differences between these affections consist in puerperal insanity being invariably traceable to disturbance of the circulation, or to animal poisoning, and in the short duration of the great majority of cases. The prognosis is, in fact, so favorable, recourse to seclusion in an asylum so painful, that it has been proposed to treat all such cases at home, or that a distinct hospital or sanatorium should be established exclusively for them. When it is stated that a physical cause may be detected in the puerperal condition, this must not be construed as excluding the psychical elements which enter into the production of all such affections. Thus, it was found by Macdonald that of 66 cases only 6 could be attributed to a purely physical origin; and that, in the majority, fright, or anxiety, or anger had formed the last or principal of that series of conditions which culminated in alienation. It affects not merely feeble and hysterical females more than others, but in a marked manner those belonging to tainted families. Of 66 patients in the Bloomingdale Asylum, 17 labored under hereditary tendency to mental disease. Unmarried are more liable to the disease than married women, in the proportion of 11 to 2: this great disparity may be explained partly by the fact that the fallen and unfortunate are, more than any other class, compelled to seek shelter in those institutions from which such statistics are obtained.—Reid on *Treatment of Puerperal Insanity;* Marcé, *Folie des Femmes Enceintes;* Simpson, *The Diseases of Women;* Barker, *The Puerperal Diseases.*

PUER'TO BEL'LO: town in Colombia: see PORTO BELLO.

PUERTO-CABELLO, *pwĕr'tō-kâ-bāl'yō*, or PORTO-CABELLO, *pōr'tō-ka-bĕl'lō:* seaport of the state of Carabobo and second in importance in Venezuela; on a narrow peninsula in the Caribbean Sea; 78 m. w. of Caracas. It has a commodious and safe harbor, defended by strong fortifications; is connected by railway with the copper region of La Luz; is the focal point of the trade of Carabobo, Lara, Zamora, and Los Andes; exports copper ore, coffee, cacao, hides, cotton, dyewoods, and sugar; foreign trade about $6,000,000 annually. Pop. (1891) 10,145.

PUERTO DE SANTA MARIA, *pwĕr'tō dā sân'tâ mâ-rē'â*, or EL PUERTO: town and seaport; province of Cadiz, Spain; on the Bay of Cadiz at the mouth of the Guadalete river; 22 m. by rail n.e. of Cadiz, 8 m. s.w. of Xeres. It is

an attractive and substantially built town, and, as it is one of the principal export harbors for sherry wine, it has direct communication with the leading commercial centres of the kingdom. While the principal industry is the shipment of wine, there are manufactories of silk goods, leather, brandy, soap, hats, liqueurs, beer, and other articles. P. is also noted for its bull fights which take place in May annually. Pop. (1887) 20,590.

PUERTO PRINCIPE, *pwĕr'tō prēn-sē'pē:* inland town in the e. part of the island of Cuba; 45 m. w.s.w. of Nuevitas, its seaport on the n. coast, with which it is connected by railway, about the same distance n. by e. of Santa Cruz on the s. coast, and 325 m. e.s.e. of Havana. It is in an agricultural and stock-raising region; is the trade centre of a large district; manufactures cigars and cures hides, and exports cattle, hides, sugar, cigars, and other articles. The town was originally laid out about 1514 at a point near the coast where an Indian village had existed, and after being moved to its present location and connected with the coast by railway, it had a rapid growth and became the third town on the island in size and in commercial importance. Pop. (1887) 46,641.

PUERTO RICO, *pwĕr'tō rē'kō:* Spanish W. India island: see PORTO RICO.

PUFENDORF, *pō'fĕn-dorf*, SAMUEL: 1632, Jan. 8—1694, Oct. 26; b. Chemnitz, Saxony; son of a Lutheran clergyman. He received his early education at Grimma; whence he removed to the Univ. of Leipzig, and studied theology for several years. In 1656 he went to the Univ. of Jena, where he seems to have applied himself at first chiefly to mathematics, and later to the study of the *Law of Nature*, as he and other writers on the subject have termed the law which regulates the duties of men to one another, independent of the mutual obligation enforced by political government or by revelation of Divine will. After quitting Jena, he was appointed tutor to the son of the Swedish ambassador at Copenhagen. Soon after he had received this appointment, a rupture having taken place between Denmark and Sweden, P. was detained as prisoner in the Danish capital. The power of his mind here showed itself in a remarkable manner. Deprived of books and of society, he threw himself vigorously into meditating on what he had formerly read in the treatise of Grotius, *De Jure Belli et Pacis*, and in the writings of Hobbes on the principles of general law. The result was the production of *Elementa Jurisprudentiæ Universalis*—the foundation of his fame and fortune. It was dedicated to the Elector Palatine; and by this prince, P. was appointed to the professorship of the law of nature and nations at the Univ. of Heidelberg. He then gave attention to the tissue of absurdities which existed in the constitution of the Germanic empire. As was to have been expected, the work (*De Statu Reipublicæ Germanicæ*, 1667) in which he exposed the defects of the system raised a storm of controversy. Austria was especially furious.

P. had taken care to publish it under a pseudonym—that of Severinus a Monzambano; still, to avoid possible trouble, he accepted an invitation from Charles XI. of Sweden, 1670, to become prof. of the law of nations at Lund. During his residence there, he published the work on which principally his fame rests, *De Jure Naturæ et Gentium*. He then removed to Stockholm, where the king of Sweden made him his historiographer, with the dignity of a counselor of state. In this official character, P. published an uninteresting history of Sweden. In 1688 the Elector of Brandenburg invited him to Berlin, to write the history of his life and reign, which P. executed in 19 dreary volumes. His intention was to return to Stockholm, but death overtook him at Berlin. P. lacked the genius to render the subjects on which he wrote generally interesting; but his intellectual power was great in the direction of logical reasoning and orderly classification; and it appears to have throughout been honestly exercised and with unflagging industry.—See Jenisch's *Vita Pufendorfii*, in the *Memoirs of the Academy of Stockholm*, 1802.

PUFF, n. *pŭf* [an imitative word: Ger. *puffen*, to puff: It. *buffare*; F. *bouffer*, to puff, to swell: Dut. *poffen*, to blow]: a breath from the mouth emitted suddenly and with some force; a whiff; a slight gust of wind; a kind of swollen and light pastry; an exaggerated commendation or advertisement; a feathery substance used in the sprinkling of powder: V. to send air from the mouth with a single and sudden blast; to drive, as with a blast; to swell, as with wind; to inflate; to swell with pride; to praise unduly; to breathe quick and hard, as after violent exertion. PUF'FING, imp.: N. the practice of one who puffs; vehement breathing, as after great exertion; exaggerated praise; in *ladies' dresses*, bands of material used as headings to a flounce or plaiting, and other parts. PUFFED, pp. *pŭft*: ADJ. blown out; inflated. PUF'FER, n. *-fėr*, one who puffs. PUFFERY, n. *pŭf'fėr-ĭ*, extravagant praise. PUF'FINGLY, ad. *-lĭ*, with shortness of breath; with exaggerated praise. PUFFY, a. *pŭf'fĭ*, swelled with air or other light matter; tumid with a soft substance; windy; bombastic. PUF'FILY, ad. *-lĭ*. PUF'FINESS, n. *-nĕs*, the state or quality of being puffy. PUFFIN, n. *pŭf'fĭn*, a water-fowl of several species, which makes a puffing sound when caught; a kind of fungus containing dust—also *puffball*. PUFFBALL, the *Lycoper'don gigantēum*, ord. *Fungi*, found in pastures and on the stumps of trees. PUFF-PASTE, among *cooks*, a dough for making the light crust of tarts, etc. PUFF-ADDER, in s. Africa, a fat, lazy, poisonous snake.

PUFF-ADDER (*Clotho arietans*: serpent of the family *Viperidæ*, having a short and broad flat head, with scales so sharply keeled as to end in a kind of spine. It is one of the most venomous and dangerous serpents of s. Africa. It attains a length of four or almost five ft., and is thick in proportion to its length, often as thick as a man's arm. Its head is very broad; its tail suddenly tapered; its color brown, checkered with dark brown and white; a reddish band between the eyes; the under parts paler than the upper. Its movements are generally slow, but it turns very quickly if approached from behind. It usually creeps partially immersed in the sand of the s. African deserts, its head

Puff-adder (*Clotho arietans*).

alone being completely raised above-ground. When irritated, it puffs out the upper part of its body, whence its name. The P. is easily killed by the oil or even by the juice, of tobacco. Its poison is used by the Bo-jesmans for their arrows.—S. Africa produces several other species of *Clotho*, similar in habits to the P., and almost equally dangerous.

PUFF BALL (*Lycoperdon*): Linnæan genus of *Fungi* now divided into many genera, belonging to the section *Gasteromycetes*, and to the tribe *Trichospores*. They grow mostly on the ground, and are roundish, generally without a stem, at first firm and fleshy, afterward powdery within: the powder consisting of the spores, and of which are many fine filaments, loosely filling the interior of the *peridium*, or external membrane. The peridium finally bursts at the top, to allow the escape of the spores, which issue from it as very fine dust. One of the most common species is *Scleroderma vulgare*, blue in black in the interior. In the Star P. (*Geaster*) the outer coat breaks away into expanded lobes, like sepals of a flower. The most remarkable species of this genus raises itself by a reflexed inner set of lobes, the tips of which rest on the tips of the outer set. Most species prefer rather dry soils, and some are found only in heaths and sandy soils. A common species is *L. gem-*

matum, generally one to two and a half inches in diameter, with warty and mealy surface. The GIANT P. (*L. giganteum*) is often many ft. in circumference, and filled with a loathsome pulpy mass when young; but in its mature state, its contents are so dry and spongy that they have often been used for stanching wounds. Their fumes, when burned, have not only the power of stupefying bees, for which they are sometimes used, in order to removal of the honey, but have been used as an anæsthetic instead of chloroform. The same properties belong to other species. Some of them, in a young state, are used in some countries as food, and none of them is known to be poisonous.

PUFF'-BIRD: see BARBET.

PUFFIN, *pŭf'fin* (*Fratercula*): genus of birds of the Auk (q.v.) family, *Alcadæ*, having the bill shorter than the head, very much compressed, its height at the base equal to its length, the ridge of the upper mandible as high as the top of the head, both mandibles arched and

Common Puffin (*Fratercula arctica*).

transversely grooved. The bill gives to the birds of this genus an extraordinary appearance. They have short legs, very short tail, and short wings; their legs are placed far back, and they sit very erect, like auks and penguins, resting not merely on the foot, but on the tarsus. Notwithstanding their shortness of wing, they fly rapidly, though they seem incapable of long-sustained flights. They swim and dive admirably. The best known and most widely distributed species is the COMMON P. (*F. arctica*), native of the arctic and n. temperate regions, migrating from the colder regions in winter, when it is found even on the coasts of Georgia and of Spain. The P. is a little larger than a pigeon; the forehead, crown, back of the head, a collar round the neck,

the back, wings, and tail are black, the other plumage white. The P. lays only one egg, sometimes in a rabbit burrow, more frequently in a burrow of its own, which often extends three ft. and is curved; sometimes in deep fissures or crevices of cliffs. Great numbers congregate together, and their chosen breeding-places are crowded with them. These are mostly on unfrequented islands and headlands, where there is some depth of soil. In some of them, the ground is covered with puffins, old and young, in thousands. The eggs are sought by fowlers, as are also the young birds, whose flesh is used for food. The Scilly Isles were held in the 14th c., under the king as lord of Cornwall, by Ranulph de Blanchminster, for an annual payment of 6*s.* 8*d.*, or 300 puffins at Michaelmas. The P. is known also by the name *Coulterneb*, and on the e. coast of Scotland it is familiarly called *Tammienorie*. Its food consists of small crustaceans and fishes.—Other species are found in different parts of the world; one in Kamtchatka, the Kurile Islands, etc., with two silky tufts of long feathers on its head.—The name P. is given in France to the *Shearwaters* (q.v.), or *Puffin Petrels*. The genus *Puffinus* of some ornithologists.

PUG, n. *pŭg* [Scot. *pud*, a little plump child: corruption of Eng. *puck*, a mischievous elf]: a lap-dog; a tame monkey; a familiar term of endearment. PUG'GY, n. *-gi*, a diminutive of pug. PUG-FACE, a monkey-like face. PUG-FACED, a. having a face somewhat like a monkey's. PUG-NOSE, a nose like a monkey's; a snub-nose. PUG-NOSED, a. having a nose like a monkey's. PUG-DOG, a small dog with a face and nose like a monkey's. PUG'GING, a. in *OE.*, thievish; prigging.

PUG, or PUG-DOG: kind of dog much like the bull-dog in form, particularly in its much abbreviated muzzle. The nose is often a little turned up. The disposition is extremely unlike that of the bull-dog, being characterized by great timidity and gentleness. Pug-dogs are kept only as pets. They are often very affectionate and good-natured, bearing without resentment the roughest handling to which children subject them. They all are of small size. The common English pug is usually yellowish with a black snout, the tail firmly curled over the back. New breeds have of late been introduced from China and Japan, interesting from their peculiar appearance, gentleness, and docility, with extremely short *pug-gish* muzzle; the Chinese breed very small, with smooth hair; the Japanese rather larger, with exuberance of long soft hair and a very bushy tail.

PUGET SOUND, *pū jĕt'*: arm of the Pacific Ocean; southern continuation of Admiralty Inlet, in the n.w. of the state of Washington. In a wide sense, P. S. includes the Admiralty Inlet: and thus would comprise the whole body of water s.e. of Vancouver Island, connecting with the Pacific by Fuca Strait, and is a land-locked sea 125 m. long, by 5 to 25 m. broad. Even in this sense, P. S. all is navigable; and the smaller inlets especially afford safe, deep, and spacious harborage. The coast-line of P. S., in the stricter sense, is 280 m.; in the wider sense, 806. Admiralty Inlet extends from the Strait of Fuca, about 70 m.; the sound itself extends s.e. from the 'Narrows,' and has numerous islands and inlets. The shores are fertile, well timbered, and abounding in mineral wealth, particularly coal. The sound received a new importance from the completion 1883 of the Northern Pacific railway, which has a main terminus at Tacoma (q.v.), and which has an extension to Seattle (q.v.), on the e. shore of the sound. Other towns on the sound are Olympia (q.v.), cap. of Washington; Steilacoom; Port Townsend (q.v.); Port Madison; Coupeville; and Victoria, B. C. (q.v.). The difficult navigation of the lower Columbia river causes much of the traffic of its basin to be sent to Tacoma to be shipped. The forest consists mainly of redwood, the timber of the *Sequoia sempervirens*. The wood is light and close grained, but not very strong; splits very easily; is eminently durable, and is well suited both for building and for cabinet-work. The only other species of the Sequoia genus is the *S. gigantea*, formerly called Washingtonia or Wellingtonia (see SEQUOIA).

PUGGAREE, n. *pŭg'ă-rē* [Hind. *pagri*]: an Indian turban; a piece of cloth for winding round the head or hat; a head-dress worn by natives of India: also spelle' PUGREE and PUGAREE.

PUGGING: see under PUG-MILL.

PUGH! int. *pô:* an exclamation of contempt or disdain.

PLATE 3.

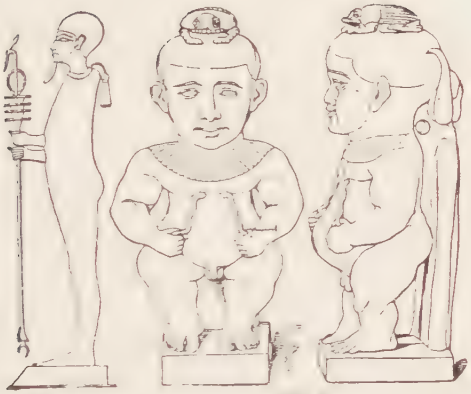


Fig. 1. Fig. 2.

Ptah.

Fig. 1. Enveloped in a mummy cloth, holding the Nilometer, and representing the unchangeable god and ruler. Fig. 2. As an undeveloped child's figure, typifying the formless condition of the world when Primordial Heat was developed.

Puma.

PŪ'GILISM, n. *pū'jil-izm* [L. *pugil*, a boxer: It. *pugile*]: the art or practice of fighting with the fists. PŪ'GILIST, n. *-ist*, one who fights with the fists; a boxer. PŪ'GILIS'TIC, a. *-is'tik*, pert. to boxing or fighting with the fists.

PU'GILISM, or BOX'ING: art of defending one's self or attacking others with natural weapons—fists and arms. The origin of boxing is probably as old as man himself. Pollux, twin-brother of Castor, in the heathen mythology, was reckoned the first who obtained distinction by use of his fists. The ancients increased the power of their fists by the addition of the Cestus (q.v.). With the ancients, pugilism was considered essential in education of youth, and formed part of the course of training practiced in their gymnasia: it was valued as a means of strengthening the body and banishing fear; but it was practiced in public rather for exhibition of the power of endurance than for mere skilful self-defense. The earliest account known of systematic British boxing dates 1740, when public exhibitions of professors of the art attracted general attention. Till this period, the science of self-defense had made little progress, and strength and endurance constituted the only recommendations of the practitioners at Smithfield, Moorfield, and Southwark fair, which had long had booths and rings for display of boxing. Broughton, for 18 years the 'champion of England,' built a theatre in Hanway street, Oxford street, 1740, for display of boxing; advertisements were issued announcing a succession of battles between first-rate pugilists, who never quitted the stage till one or other was defeated, the reward of each man being dependent on, and proportioned to, the receipts. With Broughton began the scientific era of pugilism. He propounded some rules for the ring, which remained in authority till 1838. Rule 1 was, That a square of a yard be chalked in the middle of a stage, and that, in every fresh set-to after a fall, the seconds were to bring their men to the side of the square, and to place them opposite each other; and until this was done, it was not lawful for one to strike the other. Rule 2, That if either of the combatants was unable to be brought up to the square within 30 seconds after a fall and the close of a round, he should be deemed a beaten man. No man was permitted to hit his adversary when he was down, nor to seize him by the breeches, or below the waist; and a man on his knees was to be reckoned down. These rules laid the foundation of fair play, and robbed boxing of half its horrors. They were observed till the amplified rules prepared by the late Marquis of Queensberry were accepted in England and in the United States; and the Queensberry rules in turn were superseded by the ones now generally recognized, known as the rules of the London prize-ring, and numbering 30. To Broughton is due also the introduction of gloves for 'sparring-matches,' in which lessons could be taken without in-

jury. The greatest professor of the art was Jackson, champion in 1795. He was not only the most scientific boxer of his day, but he gave his art such prestige and popularity that half the men of rank and fashion of the period called themselves his pupils. He opened rooms for practice of boxing in Bond street, and for years these were crowded by men of note. His 'principles of pugilism' were: that contempt of danger and confidence in one's self were the first and best qualities of a pugilist; that, in hitting, you must judge well your distances, for a blow delivered at all out of range was like a spent shot, and valueless; that men should fight with their legs, using all possible agility, as well as with their hands; and that all stiffness of style and position was wrong. Jackson is still regarded the best theorist on the 'noble art:' since his time it has received no essential improvement. Shaw, the life-guardsman, who immortalized himself at Waterloo, was a pupil of Jackson; and his brilliant prowess on that field was due as much to his scientific training as to his great strength. At this period, pugilism was actively supported by many persons of high rank—Dukes of York and Clarence, Earls of Albemarle, Sefton, etc., Lords Byron, Craven, Pomfret. In 1814, when the allied sovereigns were in England, among other entertainments a 'sparring' display was provided under Jackson's management; and the distinguished foreigners expressed their great gratification at the exhibition of so much science and fine physical development. Besides Jackson, noted champions at this period were Belcher, Gulley, and Cribb. George IV. was a stanch patron of boxing in his youth, and, though he discontinued countenancing the sport by his presence, frequent indications were observable of his desire for its promotion. At the time of the coronation, when the popular feelings were much enlisted on behalf of Queen Caroline, who was excluded from the throne, a body of pugilists were employed to preserve order; and so well did these men perform their duties, that the king presented each man with a gold medal, to commemorate the event, and to show his satisfaction. This period may be termed the 'palmy days of the ring;' and from various causes, its decline has since then been uninterrupted. Among other causes, several cases occurred of prize-fighters who were bribed to lose fights on which large sums had been staked, and to deceive their most influential backers. The more distinguished patrons of the ring gradually seceded; the 'Pugilistic Club,' which had been established 1814, and which included all the aristocratic patrons of the ring, was broken up. The magistracy of the country set their faces against the lawless assemblies of 'roughs' and pickpockets who latterly formed the greater part of the spectators at prize-fights. The electric telegraph, and the establishment of an efficient rural police, have given the finishing touches to an already expiring profession. Matches can now in Britain be entered into only by

stealth, and the place of meeting is kept a profound secret to the last moment, for fear of interruption. 1860, Apr. 17, however, the international combat between Tom Sayers, the Englishman, and John Heenan, the American, revived for a moment public interest in the art; but apart from exceptional matches, the popular feeling is that prize-fighting should not be countenanced, and we may look for its gradual extinction. The art of boxing, as an active and healthful exercise, is likely to be maintained; and the display of science between two accomplished boxers is very interesting, while it is deprived of the brutal horrors of the prize-ring. In the United States, fighting with bare knuckles in public, and for a money or other prize, is forbidden by state laws. In N. Y. and elsewhere the laws have been evaded by known pugilists meeting in ring costume in public and semi-public places, and having a regular fight, except that they wore the thinnest kind of gloves and called their encounters feats of skill, or scientific boxing-matches, instead of prize-fights. But, as many of these matches developed into brutal 'slugging' exhibitions, they gradually lost attractiveness for the 'fancy,' and boxing-matches proper are now mainly confined to gymnasiums and athletic club-houses. A notable prize-fight took place at Richburg, Miss., 1889, July 8, between John L. Sullivan and John J. Killion (better known as Jake Kilrain), in which Sullivan won in the 76th round. After this stubbornly contested victory Sullivan refused to accept the championship belt, declined several challenges, and went on the stage in a play written for him, *Hearts of Oak*, 1890. In 1893 he accepted a challenge from James J. Corbett for a fight for the championship of the world, $10,000 a side, and a purse of $25,000. The fight took place in New Orleans, Sep. 7, and Corbett won in 21 rounds. Sullivan then retired from the ring permanently. Corbett defeated Charles Mitchell, English champion, at Jacksonville, Fla., 1894, Jan., in 2 rounds, and signed articles to meet Robert Fitzsimmons at the same place, some time after 1895, July 1, for the championship of the world, a side wager of $20,000, and a purse of $41,000. The champions of the prize-ring in the United States have been: Tom Hyer 1841—about 1850; Yankee Sullivan 1850–53; John Morrissey 1853–57; John C. Heenan 1857–63; Joe Coburn 1863–4; Bill Davis 1864–5, May 16; Jim Dunn 1865, May 16, to his retirement the same year; Bill Davis from Dunn's retirement to 1866, Sep. 19; Mike McCool 1866, Sep. 19—1869, July 15; Tom Allen 1869, July 15—1870, May 10; Jem Mace 1870, May 10, till his retirement; Tom Allen from Mace's retirement to 1876, Sep. 7; Joe Goss 1876, Sep. 7—1880, June 1; Paddy Ryan 1880, June 1—1882, Feb. 7; John L. Sullivan 1882, Feb. 7, till his forfeit to Kilrain 1887; Jake Kilrain from Sullivan's forfeit to 1889, July 8; John L. Sullivan 1889, July 8—1893, Sep. 7; and James J. Corbett since.

English and American pugilists of the present day are mostly saloon keepers or variety stage performers. It has constantly been urged in defense of pugilism that,

were it abolished, the use of the knife would increase, and there would be a loss of the present manly system of self-defense. This might be true only if the use of the fist in self-defense depended on the mercenary exhibition of pugilistic encounters often fraudulent; but this is mere assumption.—On this subject, see *Fistiana* (office of *Bell's Life*, 1868); *Pugilistica*, by H. D. Miles (1880).

PUGIN, *pū-zhăn′*, Augustus: architect: 1769–1832; b. Normandy. In early life he removed to London and found employment as a draughtsman. He made many architectural drawings, some of which were published in *Microcosm of London;* afterward gave special attention to mediæval architecture. Among his published works were: *Specimens of Gothic Architecture; Specimens of the Architectural Antiquities of Normandy;* and *Gothic Ornaments*. In preparing the two latter works, he had the assistance of his son. With John Britton, he published *Architectural Illustrations of the Buildings of London*.

PUGIN, *pū′jin*, Augustus Welby Northmore: architect: 1812, Mar. 1—1852, Sep. 14; b. London; son of Augustus P., London architect. After being educated in one of the city schools, he studied drawing under his father, whom he several times accompanied to France on his professional visits. After working for a time as a designer, he established a manufacturing business; but it was unsuccessful, and he gave himself to his profession, in which, in a few years, he became eminent. He left the Established Church for the Rom. Cath., designed several splendid church buildings, and with Charles Barry designed the new houses of parliament. Some of his pen-and-ink sketches are among the most beautiful ever executed. He published *True Principles of Christian Architecture*, and other architectural works. —His son, Edwin Welby P. (1834–75, b. England), architect, completed some unfinished sketches left by his father, and designed several important buildings. Among the latter were the cathedral at Queenstown and the Carmelite church at Kensington.

PUG-MILL, n. *pŭg′-mĭl* [Dan. *pukke*, to pound ore before smelting: Pol. *puk*, the noise of a blow]: a mill for working up clay for bricks. Pug′ging, n. a stuffing or plaster put between floors to deaden sound.

PUGNACIOUS, a. *pŭg-nā′shŭs* [L. *pugnax* or *pugnācem*, combative—from *pugnārĕ*, to fight: It. *pugnace*, warlike]: inclined to fighting; quarrelsome. Pugna′ciously, ad. *-lĭ*. Pugnacity, n. *pŭg-năs′ĭ-tĭ* [L. *pugnācitas*]: inclination to fight; quarrelsomeness.

PUGREE, n. *pŭg′rē*, or Pugaree, n. *pŭg′ă-rē:* see under Puggaree.

PUING, n. *pū′ing* [an imitative word: Scot. *pew*, to cheep as a chicken (see Pule)]: a word expressing one of the sounds made by birds.

PUISNE, n. *pū'nĕ* [OF. *puisné;* F. *puîné*, younger—from *puis*, since; *né*, born: L. *post nātus*, born after]: younger or inferior in rank; a term applied to certain of the English judges: this word is now Anglicized into PUNY, in the sense of *small*.

PUISSANT, a. *pū'is-ănt* [F. *puissant;* It. *possente*, powerful—from a supposed L. *possens* or *possentem*, powerful—from *possĕ*, to be able]: powerful; strong; mighty. PU'ISSANTLY, ad. *-lĭ*. PU'ISSANCE, n. *-săns*, power; strength; might.

PUJA, or POOJAH, n. *pō'jă* [Skr. *puja*]: among *Hindus*, devotion; a religious act of worship; a festival.

PUKE, v. *pūk* [Ger. *spucken*, to spit: Hung. *pök*, spittle]: to eject from the stomach; to vomit: N. a vomit; a fit of vomiting; an emetic. PUK'ING, imp. PUKED, pp. *pūkt*.

PUKE, n. *pūk:* perhaps another form of PUCE, which see; in *OE.*, a brownish purple.

PULASKI, *pū-lăs'kī*. Pol. *pū-lás'kē*, CASIMIR, Count: soldier: 1748, Mar. 4—1779, Oct. 11; b. Podolia; son of Joseph P., who founded the confederation of Barr. He received a good education, and, in the army of Duke Charles of Courland, aided in resisting Russian tyranny, and at length became commander-in-chief of the revolted forces. At the partition of Poland 1772, his property was confiscated and a reward was offered for his head. He fled to Turkey and served a short time in the army, but, obtaining only slight recognition, went to France, where he met Benjamin Franklin and became interested in the war for independence of the Amer. colonies. He came to Philadelphia 1777, Mar.; joined the staff of Gen. Washington; rendered efficient service at the battle of Brandywine, for which, at the request of Washington, he was commissioned brig.-gen.; gained distinction at the battle of Germantown, and afterward raised and commanded a force known as Pulaski's legion. He was sent to S. C. 1779, made a brilliant defense of Charleston, and pursued the enemy out of the state. At the assault on Savannah 1779, Oct. 9, he commanded both the American and French cavalry, and received a mortal wound. A monument to his memory was erected by the citizens of Savannah. The *Life of Count Pulaski*, by Jared Sparks, appeared in the *American Biography* (1845).

PULCHRITUDE, n. *pŭl'krĭ-tūd* [L. *pulchritūdo*, beauty—from *pulcher*, beautiful]: beauty; comeliness; grace; moral beauty.

PULCI, *pōl'chē*, LUIGI: Italian poet: 1431, Dec. 3—1487; b. Florence, of distinguished family. He spent his life in study and literary composition. He was one of the most intimate friends of Lorenzo de' Medici and of Poliziano, deriving from the latter no little assistance in composition of his poem *Il Morgante Maggiore* (Morgante the Giant). This celebrated work, burlesque epic (in 28 cantos), of which Roland is the

hero, is a vivacious parody of the romances of Carlovingian chivalry, which had become (P. thought) undeservedly popular in Italy. His mocking imagination took pleasure in turning into ridicule the combats with giants, the feats of magicians, and all the incredible adventures that form the material basis of the mediæval epic; and he did it with wonderfully pleasant and original *naïveté*. But though the poem is essentially heroico-comic, it occasionally contains passages of finest pathos, in which P. fortunately seems to forget his design of travestying the inventions of the *trouvères*, and comes out undisguisedly as a real poet. Moreover, in the midst of the most extravagant buffooneries, we come on true and natural pictures of manners—the vanity and inconstancy of women, the avarice and ambition of men. The *Morgante Maggiore* is one of the most valuable sources for knowledge of the early Tuscan dialect, the niceties and idioms of which were employed by P. with great skill. The first ed. appeared at Florence 1488, and has since been frequently reprinted. Other works of P. are a series of sonnets (often grossly indecent); *La Beca da Dicomano* (parody of a pastoral poem by Lorenzo de' Medici); *Confessione à la San Vergine*, a novel; and some letters.—BERNARDO P., elder brother of Luigi, wrote an elegy on the death of Simonetta, mistress of Julian de' Medici; and a poem on the passion of Christ; and executed the first translation of the *Eclogues* of Virgil.—LUCA P., another brother, achieved some literary reputation by *Giostra di Lorenzo de' Medici*, poem in honor of the success won by Lorenzo in a tournament; *Il Ciriffo Calvanco*, metrical romance of chivalry; *Driadeo d'Ancore*, pastoral poem; and *Epistole Eroide*.

PULE, v. *pūl* [F. *pioler*, to cheep as a young bird: L. *pīpīārĕ*, to chirp: an imitative word]: to cry like a chicken; to whine; to cry as a whimpering child. PUL'-ING, imp.: ADJ. whimpering: N. a cry, as of a chicken; a whining. PULED, pp. *pūld*. PUL'INGLY, ad. *-lĭ*.

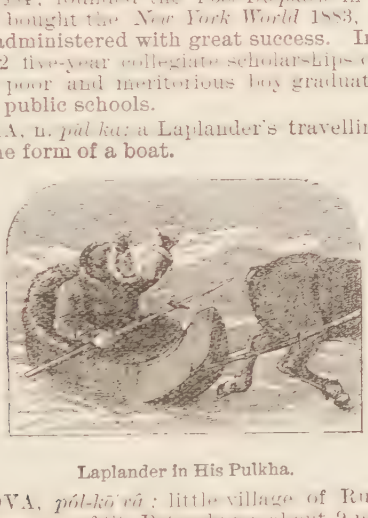
PU'LEX: see FLEA.

PULICAT, *pô-lĭ-kât'*, or PALIKAT, *pâ-lĭ-kât'*, or PALVELAKA'TU: town of Brit. India, presidency of Madras, dist. of Chingleput, 20 m. n. from Madras. It stands on an island in a large inlet of the sea or salt-water lake called the Lake of P. This lake is about 37 m. long from n. to s., and 11 m. in breadth at the widest. It contains a number of islands. The communication between the lake and the sea is by very narrow openings. The lake is much used as affording facilities of traffic by boats between Madras and more northern places. P. was occupied by the Dutch 1609, and became afterward cap. of their settlements on the Coromandel coast, but fell into the hands of the British 1795.

PULICENE, a. *pū'lĭ-sēn* [L. *pulex, pulicis*, a flea]: pertaining or relating to fleas; pulicous.

PULITZER, *pō'lits-ėr*, JOSEPH: journalist: b. Buda-Pesth, 1847, Apr. 10. He removed 1865 to St. Louis, where he learned the English language and entered journalism; was elected to the Mo. legislature 1869, delegate to the Cincinnati convention 1872, member of state constitutional convention 1874, delegate to the democratic national convention 1880, and member of congress 1884; founded the *Post-Dispatch* in St. Louis 1878; and bought the *New York World* 1883, which he has since administered with great success. In 1890 he founded 12 five-year collegiate scholarships of $250 annually for poor and meritorious boy graduates of the New York public schools.

PULKHA, n. *pul'ka:* a Laplander's travelling sledge, made in the form of a boat.



Laplander in His Pulkha.

PULKOVA, *pōl-kō'vâ*: little village of Russia (pop. 600), in the govt. of St. Petersburg, about 9 m. s. of the cap.; on a ridge called the Pulkova Hills, with a splendid view of St. Petersburg. P. is noted for its magnificent observatory, built by Czar Nicholas, and placed under the direction of Friedrich Struve. Struve's son succeeded to the charge 1864. In 1882 a remarkable telescope, said to be then the largest in the world, was erected here.

PULL, v. *pûl* [AS. *pullian*, to pull: Low Ger. *pulen*, to pick: Gael. *spiol*, to pull, to tug: L. *pellĕrĕ*, to drive]: to draw forcibly; to rend; to draw toward one; to pluck; to gather; to haul or tug; of *fowls*, etc., to take out the large sinews: N. act of pulling; a pluck; a drawing; a contest; violence suffered. PULL'ING, imp. PULLED, pp. *pûld*. PULL'ER, n. one who or that which pulls. TO PULL APART, to separate by pulling. TO PULL DOWN, to demolish; to degrade. TO PULL OFF, to remove; to separate by pulling. TO PULL OUT, to extract; to draw out. TO PULL UP, to pluck up; to extirpate; to stop.—SYN. of 'pull, v.': to pluck; tug; draw; gather; tear; rend; subvert; demolish; degrade; eradicate.

PULLET, n. *pûl'lĕt* [F. *poulet*, a chicken—from *poule*, a hen: L. *pullus*, a young animal]: a young hen; a chicken.

PULLEY, n. *pûl'li* [F. *poulie;* It. *poliga*, a pulley: Dut. *paleye*, a frame for torture, a pulley (from PULL)]: one of the six mechanical powers, consisting of a wheel turning on an axis, on which a rope or chain runs in a groove. *Note.*—PULLEY is also derived by some from L. *pullus*, a young animal, mid. L. *pullanus*, a colt—the names of the goat and horse being formerly employed to designate mechanical contrivances.

PUL'LEY: one of the Mechanical Powers (q.v.): consisting of a wheel, with a groove—to receive a cord or rope—cut all round its circumference; and movable on an axis. The wheel, commonly called a *sheave*, is often placed inside a hollow oblong mass of wood called a *block*, and to the sides of this block the extremities of the sheave's axle are fixed for support: the cord which passes over the circumference of the sheave is called the

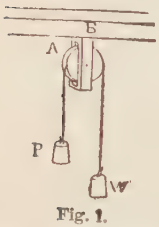


Fig. 1.

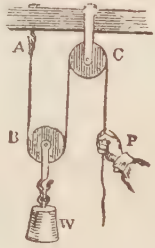


Fig. 2.

tackle. Pulleys may be used either singly or in combination; in the former case, they are either *fixed* or *movable*. The *fixed pulley* (fig. 1) gives no mechanical advantage; it merely changes the direction in which a force would naturally be applied to one more convenient—thus, W can be raised without lifting it directly by merely pulling P down. The *single movable pulley*, with parallel cords, gives a mechanical advantage = 2 (fig. 2); for a little consideration will show that as the weight, W, is supported by two cords, the strain on each cord is $\frac{1}{2}$W, and the strain on the one being supported by the hook, A, the power, P, requires merely to support the strain on the other cord, which passes round C. The fixed pulley, C, is of service only in changing the naturally upward direction of the power into a downward one. If the cords in the single movable pulley are not parallel, there is diminution of mechanical advantage—i.e., P must be more than half of W to produce an exact counterpoise; if the angle made by the cords is 120°, P must be equal to W; and if the angle be greater than this, there is a mechanical disadvantage, or P must be greater than W. The following are examples of different combinations of pulleys, generally known as the first,

second, and third systems. In the first system, one end of each cord is fastened to a fixed support above; each cord descends, passes round a pulley (to the lowest of which the weight, W, is fastened), and is fastened to the block of the next pulley, with the exception of the last cord, which passes round a fixed pulley above, and is at-

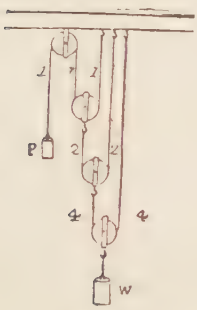


Fig. 3.

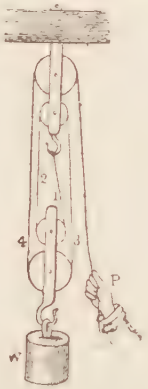


Fig. 4.

tached to the counterpoise, P. The tension of a cord being the same in all its parts, the tension of every part of the cord marked 1 in fig. 3 is that which is produced by the weight of P; consequently, as the last

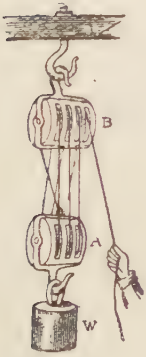


Fig. 5.

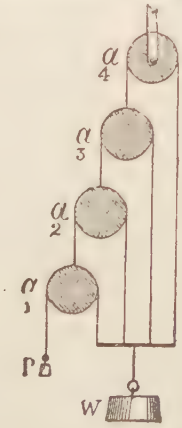


Fig. 6.

movable pulley is supported on both sides by a cord having a tension P, the tension applied in its support is 2P. The tension of the cord marked 2 is therefore

2P, and the second movable pulley is supported by a force equal to 4P. It may similarly be shown that the force applied by the cords marked 4, in support of the last pulley (which is attached to W), is 8P. Hence, we see that, according to this arrangement, 1 lb. can support 4 lbs., if two movable pulleys are used; 8 lbs., if there are 3 movable pulleys; 16 lbs., if there are 4 movable pulleys; and if there are n movable pulleys, 1 lb. can support 2^n lbs. It must be noticed, however, that in practice the weight of the cords and of the pulleys, and the friction of the cords on the pulleys, must be allowed for; and the fact that in this system all of these resist the action of the power, P, and this to a large extent, has rendered it of little use in practice.—The second system is much inferior in producing a mechanical advantage, but is found much more convenient in practice, and is modified according to the purpose for which it is to be used; two prevalent forms are given in figs. 4 and 5. In this system, one cord passes round all the pulleys, and, as the tension in every part of it is that produced by the weight of P, the whole force applied to elevate the lower block with its attached weight, W, is the weight P multiplied by the number of cords attached to the lower block; in fig. 4, W = 4P, and in fig. 5, W = 6P, the pulleys in the upper block being of use only in changing the direction of the pulling force. This system is the one in common use in architecture, in dockyards, and on board ship; and various modifications of it—such as White's pulley, Smeaton's pulley, etc.—have been introduced; but the simpler forms shown above have been found to serve best.—The third system (fig. 6) is merely the first system inverted, and it is a little more powerful, besides having the weight of the pulleys to support the power, instead of acting in opposition to it, as in the former case By what has been said above, it has become evident that the mechanical advantage is produced not by the pulleys, but by the cords; and that the pulleys are useful merely in keeping the cords in a certain position, changing with as little friction as possible the direction of the pull, and affording a convenient means of attaching the weight. Theoretically, the larger the number of movable pulleys in one combination, the greater is the mechanical advantage afforded; but the enormous friction produced, and the want of perfect flexibility in the ropes, prevent any great increase in the number of pulleys.

PULLMAN, *pŭl'man:* town in Hyde Park township, Cook co., Ill.; on Lake Calumet and the Illinois Central railroad; about 13 m. s. of Chicago, of which city it is a part; founded by the Pullman Palace-car Company, 1880. It is laid out on the most approved scientific plans, and was designed to become a model industrial and social city. Its manufactories, which give direct employment to more than one-half its entire population, comprise the principal works of the palace-car company proper and allied industries controlled by it. All the buildings,

except the church and parsonage, are of brick, and built in groups of two or more and in blocks, with lawns separating them from the streets; and interiorly are models of convenience and sanitation. The notable buildings are the Arcade, 256 ft. long, 146 wide, and 90 high, containing stores, shops, savings bank, theatre, and library; the Market-house, 100 by 110 ft., containing basement and ground stalls and a public hall; and the commodious and attractive school-house. All stores and shops in the town are confined to the Arcade and Market-house. The town also contains a large hotel, several public squares, fire dept., and gas and electric light plants. Everything in and about the place belongs absolutely to the car company. It has provided a pretty place of residence for its employés, with parks, savings bank, theatre, and well-stocked library; but it rents everything—even the church building is hired by the congregation—and will sell nothing. Rents vary from $1.50 per month for the commonest flats of two rooms to $100 for the largest private dwelling, average $14 to $25 per month, and pay an enormous profit on the cost of land and building.—P. affords abundant material for the study of an interesting phase of modern socialism, and, as the last extensive experiment in that line, it should be considered in connection with the work of the city of Edinburgh; Sir Sydney Waterlow, Baroness Burdett-Coutts, and George Peabody, in London; the Krupps in Essen, Prussia; Schneider in Cruzot, France; and Sir Titus Salt in Saltaire, England—all in the direction of providing wholesome dwellings with moral surroundings for people of limited means. Pop. (1890) about 10,000.

PULL'MAN, George Mortimer: inventor: b. Chautauqua co., N. Y., 1831, Mar. 3—1897, Oct. 19. After learning cabinet-making, he engaged in raising and moving large and heavy buildings in the neighborhood of the Erie canal and in Chicago, where he settled 1859; began building the improved 'sleeping' railroad cars that bear his name 1863; organized the palace-car company 1867; and introduced the system of vestibuled trains 1887. To facilitate the construction of his cars, he established extensive works near Chicago, around which has grown the industrial town of Pullman (q.v.). He received a degree and decoration of knighthood from the king of Italy 1886, and was appointed by Pres. Harrison one of three continental r.r. commissioners 1890.

PULL'MAN, James Minton, D.D.: Univ. minister: b. Portland, N. Y., 1836, Aug. 21; brother of George Mortimer P. He graduated at St. Lawrence Divinity School 1860; was pastor of the 1st Univ. Church, Troy, 1861–68; of the 6th Univ. Church, New York, 1868–85; and of the 1st Univ. Church, Lynn, Mass., since 1885; was sec. of the Univ. gen. convention 1868–77, chairman of the publication board of the N. Y. state convention 1869–74, and trustee of St. Lawrence Univ. 1870–85; and received his degree from St. Lawrence 1879.

PULLULATION, n. *pŭl'lū-lā'shŭn* [L. *pul'lŭlātus*, put forth sprouts—from *pul'lŭlus*, a sprout; *pullus*, a young animal]: in *bot.*, a germination or budding; the first shooting of a bud.

PULMOGRADE, a. *pŭl'mō-grād* [L. *pulmo*, a lung *grădi*, to walk]: having a lung-like movement; moving by the expansion and contraction of the body, especially of the disk, as in the case of the Medusæ.

PULMONARIA, n. plu. *pŭl'mŏn-ā'rĭ-ă* [L. *pulmo* or *pulmōnem*, a lung]: a genus of perennial herbs, some of the species having spotted leaves—called also 'lungwort' and 'Jerusalem cowslip;' the *Pulmonārĭă officinālis*, ord. *Boraginăcĕæ*. PULMONARIA, or PUL'MONARIES, n. plu. *-ăr-iz*, the arachnida that breathe by pulmonary sacs. PUL'MONALE, a. *-āl*, possessing lungs.

PULMONARY, a. *pŭl'mŏn-ér-ĭ* [It. *polmonare;* F. *pulmonaire*, pulmonary—from L. *pulmonārĭŭs*—from *pulmo* or *pulmōnem*, a lung]: pert. to the lungs; affecting the lungs. PULMONIC, a. *pŭl-mŏn'ĭk*, pert. to the lungs; consumptive: N. a medicine good for affections of the lungs; one diseased in the lungs. PULMONATE, a. *pŭl'mŏn-āt*, having lungs. PULMONARY MURRAIN (see CATTLE-PLAGUE). PULMONARY DISEASE (see TUBERCULOSIS).

PULMONATA, *pŭl-mō-nā'tâ:* order of gasteropodous mollusks, having, for the purpose of respiration, a vascular air-sac or lung, which opens by a hole under the margin of the mantle, capable of being contracted or dilated at pleasure. Some are terrestrial, some aquatic. Slugs and snails are familiar examples of the former; water-snails, or pond-snails (*Limnæa, Planorbis*, etc.), of the latter. Most of the P. are protected by a shell; in some, as slugs, the shell is internal and rudimental.

PULMONI-, prefix, *pŭl-mŏn-ĭ-* [L. *pulmo, pulmonis*, a lung]: of or belonging to the lungs.

PULMONIFER, n. *pŭl-mŏn'ĭ-fér* [L. *pulmo* or *pulmōnem*, a lung; *fero*, I bear]: an animal having lungs. PUL'MONIF'EROUS, a. *-ĭf ér-ŭs*, having lungs; having organs acting as lungs.

PULNEY, *pŭl'nĭ* (or PALNAI, *pâl-nī'*), HILLS: mountain range of s. India, linking the s. extremities of the E. and W. Ghauts; average height about 7,500 ft. The climate of the P. is singularly pleasant and equable, the sanatorium of Kodaikanal being preferred by many to Ootacamund.

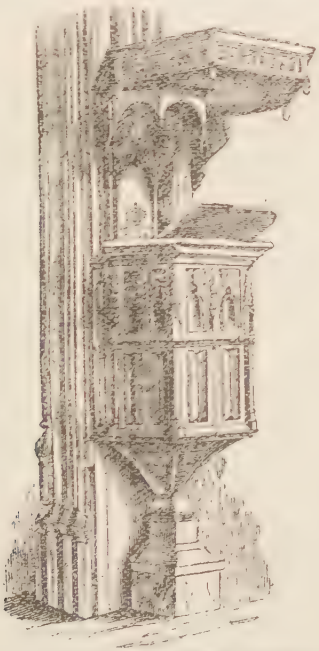
PU'LO-PENANG': see PRINCE OF WALES ISLAND 2.

PULP, n. *pŭlp* [F. *pulpe*—from L. *pulpa*, flesh, pith: It. *polpa*]: the soft and juicy tissue of plants; a soft mass; the aril of the coffee-berry; in *anat.*, the inner surface of the tooth: V. to reduce to a soft mass; to separate from the fibrous and harder portions. PULP'ING, imp. PULPED, pp. *pŭlpt*. PULPY, a. *pŭlp'ĭ*, soft; fleshy. PULP'INESS, n. *-nĕs*, the state of being pulpy. PULP'OUS, a. *-ŭs*, resembling pulp; soft like pap. PULP'OUSNESS, n. *-nĕs*, the state or quality of being pulpous.

PULP, in Botany: those very soft and succulent parts of plants, almost exclusively of fruits, which consist of cellular tissue with much juice. The pulp of a fruit is found sometimes in one part of it, sometimes in another; thus, in the peach, plum, and other drupes, it is the *mesocarp;* in the grape and gooseberry, it is developed from the placentas, and the seeds are embedded in it.

PULPIT, n. *pŏl pit* [It. and Sp. *pulpito*, a pulpit—from L. *pulpitum*, a stage or platform: F. *pupitre*, a desk]: a raised and generally inclosed desk in a church or chapel, from which the sermon or lecture is delivered: ADJ. pert. to or resembling the pulpit; connected with the pulpit. PUL'PITED, a. *-pit-ĕd*, placed in a pulpit.

PUL'PIT [L. *pulpitum*]: elevated tribune, or a desk on a stage, from which sermons, lectures, and other solemn religious addresses are delivered. In great



Pulpit (Fotheringhay, Northamptonshire, England, A.D. 1440). (From Parker's *Glossary.*)

churches, the P. is placed usually against the wall, or in juxtaposition with a pillar or buttress. Originally it appears to have been used chiefly for the singing, chanting, or recitation which form part of the public service, and was a kind of stage sufficiently large to accommo-

date two or even more chanters. For convenience of the hearers, this stage began to be used by the bishop, priest, or deacon, for the delivery of the homily; and thus by degrees a tribune expressly suited to the latter use alone came to be introduced. In some of the older churches, the *ambo* or *pulpitum* is still used for the chanting of the Gospel and Epistles. In Rom. Cath. churches, the P. is usually distinguished by some religious emblems, especially by the crucifix; and the pulpits of the Low Countries and of Germany are often masterpieces of wood-carving, the preaching-place in some of them forming part of a great artistic group—e.g., of the Conversion of St. Paul, the Vocation of Peter and Andrew, the Temptation of Adam and Eve, and similar subjects. The P. (in Arabic, *mimber*) forms one of the scanty appliances of Mohammedan worship.

In prelatical churches, the P. is usually small, accommodating only the preacher, who does not enter it till about the time to begin the sermon. In other churches, in whose public services preaching holds a more important place, the P. is usually large and centrally placed; indeed the term has been extended to include also the platform on which the P. proper (or preaching-desk) stands, and which holds seats for several ministers.

PULQUE, n. *pûl'kā* [Sp. *pulque*]: favorite beverage of the Mexicans and of the inhabitants of Central America and parts of S. America; made from the juice of different species of *Agave* (q.v.), which is collected by cutting out the flowering-stem from the midst of the leaves in the beginning of its growth, and scooping a hole for the juice. From this cavity, large quantities of juice are removed daily for months. The juice is an agreeable drink when fresh, but is more generally used after fermentation, when it has a very pleasant taste, but a putrid smell, disgusting to those unaccustomed to it. Pulque is retailed in Mexico in open sheds called *Pulquerias*, which serve also for dancing-rooms. When mixed with water and sugar, and allowed to ferment for a few hours, it forms a beverage called *Tepache*. A kind of spirit also is prepared from it.

PULSATE, v. *pŭl'sāt* [L. *pulsātus*, beaten, struck—from *pulsārĕ*, to beat; *pulsus*, a beating, a stroke of the oars in rowing]: to beat or throb, as the heart. PUL'SATING, imp. PUL'SATED, pp. PULSATION, n. *pŭl-sā'shŭn* [F.—L.]: the beating or throbbing of the heart or of an artery; a stroke by which some medium is affected, as light, sound, etc.; vibration. PULSATILE, a. *pŭl'sā-tĭl*, that may be beaten; played by beating, as a drum; beating, as a pulse. PUL'SATIVE, a. *-tĭv*, or PUL'SATORY, a. *-tĕr-ĭ*, beating; throbbing, as the heart or pulse.

PULSATILLA, n. *pŭl'să-tĭl'lā* [new L.: It. *pulsatile*, throbbing—from L. *pulsātus*, pushed, set in violent motion]: a homeopathic medicinal preparation from the *Anemōnē pulsatil'la*, or wind-flower: see PASQUE FLOWER.

PULSE, n. *pŭls* [L. *pulsus*, a beating, a stroke—from *pellĕrĕ*, to drive: Sp. *pulso*, the pulse, the wrist]: the alternate contractions and dilatations of an artery, caused by the action of the heart, and perceptible to the touch; a throb; any measured or regular beat. PULSE'LESS, a. *-lĕs*, without a perceptible pulse. PULSE'LESSNESS, n. *-nĕs*, the state of being pulseless.

PULSE, n. *pŭls* [Sw. *pylsa*, a pucker in clothes: Icel. *pylsa*; Dan. *pölse*, a sausage: Sp. *bolsa*, a bag]: grain contained in a pod or case; name for edible seeds of leguminous plants, as grains for those of grasses. Peas and beans are the most common and important of all kinds of pulse; next may be ranked kidney-beans, lentils, chick-peas, pigeon-peas, etc. *Legumine* (q.v.), a very nitrogenous principle, abounds in all kinds of pulse. Legumine forms a thick coagulum with salts of lime; wherefore all kinds of pulse remain hard if boiled in spring-water containing lime. The best kinds of pulse are very nutritious, but not easy of digestion, and very apt to produce flatulence.

PULSE [L. *pulsus*, a pushing or beating]: the phenomenon known as the arterial pulse or arterial pulsation, due to the distention of the arteries consequent on the intermittent injection of blood into their trunks, and the subsequent contraction which results from the elasticity of their walls. It is perceptible to the touch in all excepting very minute arteries, and in exposed positions is visible to the eye. 'This pulsation,' says Dr. Carpenter, 'involves an augmentation of the capacity of that portion of the artery in which it is observed; and it would seem to the touch as if this were chiefly effected by an increase of diameter. It seems fully proved, however, that the increased capacity is chiefly given by the elongation of the artery, which is lifted from its bed at each pulsation, and, when previously straight, becomes curved; the impression made upon the finger by such displacement not being distinguishable from that which would result from the dilatation of the tube in diameter. A very obvious example of this upheaval is seen in the prominent temporal artery of an old person.'—*Principles of Human Physiology*, 4th ed., 492. The number of pulsations is counted usually at the radial artery at the wrist, the advantages of that position being that the artery is very superficial at that spot, and that it is easily compressed against the bone. In some cases, it is preferable to count the number of contractions of the heart itself.

The qualities chiefly attended to in the pulse are its frequency, its regularity, its fulness, its tension, and its force.

The *frequency* of the pulse varies greatly with the age. In the fetus *in utero*, the pulsations vary from 140 to 150 in the minute; in the newly-born infant, 130 to 140; in the 2d year, 100 to 115; from the 7th to the 14th year, 80 to 90; from the 14th to the 21st year, 75 to 85; and

from the 21st to the 60th year, 70 to 75. After this period, the pulse is generally supposed to fall in frequency, but the most opposite assertions have been made on this subject. There are many exceptions to the preceding statement; young persons being often found to have a pulse below 60, and frequent cases in which the pulse habitually reaches 100, or does not exceed 40, in the minute, without apparent disease. The numbers above given are taken from an equal number of males and females, and the pulsations taken in the sitting position. The influence of sex is considerable, especially in adult age, the pulse of the adult female exceeding in frequency that of the male of the same age by 10 to 14 beats in the minute. The effect of muscular exertion in raising the pulse is well known; and it has been found by Dr. Guy that posture materially influences the number of pulsations. Thus, in healthy men of the mean age of 27 years, the average frequency of the pulse was—when standing 81, when sitting 71, and ween lying 66, per minute; while in healthy women of the same age the averages were—standing 91; sitting 84; and lying 79. During sleep, the pulse is usually considerably lower than in the waking state. In disease (acute hydrocephalus, for example), the pulse may reach 150 or even 200 beats; or, on the other hand (as in apoplexy and in certain organic affections of the heart), it may be as slow as between 30 and 20.

Irregularity of the pulse is a condition requiring notice. There are two varieties of irregular pulse: in one, the motions of the artery are unequal in number and force, a few beats being from time to time more rapid and feeble than the rest; in the other variety, a pulsation is from time to time entirely left out, constituting intermission of the pulse. These varieties often concur in the same person, but they may exist independently of each other. Irregularity of the pulse is natural to some persons; in others, it is the mere result of debility; but it may be caused by the most serious disorders, as by disease of the brain, or by organic disease of the heart; and hence the practical importance of ascertaining the various meanings of this symptom.

The pulse is said to be *full* when the volume of the pulsation is greater than usual, and it is called *small* or *contracted* under the opposite condition. A full pulse may depend on general plethora, on a prolonged and forcible contraction of the left ventricle of the heart, and possibly, to a certain extent, on relaxation of the arterial coats; while a small pulse results from general deficiency of blood, from feeble action of the heart, from congestion of the venous system, or from exposure to the action of cold. When very small, it is termed *thread-like*.

The *tension* of the pulse is the property by which it resists compression, and may be regarded as synonymous with *hardness*. A hard pulse can scarcely be stopped by any degree of pressure of the finger. It oc-

curs in many forms of inflammation, and its presence is regarded usually as one of the best indications of the necessity of venesection. A *soft* or compressible pulse is indicative of general weakness.

The *strength* of the pulse depends chiefly on the force with which the blood is driven from the heart, but partly also on the tonicity of the artery itself and the volume of the blood. A strong pulse is correctly regarded as a sign of a vigorous state of the system; it may, however, arise from hypertrophy of the left ventricle of the heart, and remain as a persistent symptom even when the general powers are failing. As strength of the pulse usually indicates vigor, so *weakness* of the pulse indicates debility. There may, however, be cases in which weakness of the pulse may occur in association with undiminished energy of the system at large—e.g., active congestion of the lungs may so far impede the passage of the blood through these organs that it cannot reach the heart in due quantity: the necessary result is a weak and feeble pulse, which will rapidly increase in strength if the congestion is relieved by free blood-lettings. Various expressive adjectives have been attached to special conditions of the pulse: thus, we read of the jerking pulse, the hobbling pulse, the corded pulse, the wiry pulse, the thrilling pulse, the rebounding pulse, etc.

PULTACEOUS, a. *pŭl-tā shŭs* [L. *puls* or *pultem*, a thick pap or pottage made of meal or pulse: *Gr. poltos*, pottage]: macerated; softened with fluid; soft like a poultice.

PULTENÆA, n. *pŭl'tĕn-ē'ă* [after Dr. *Pulteney*]: Australian papilionaceous shrubs, ord. *Leguminōsæ*. PUL'TENÆ'A RO'SEA, a species bearing in great profusion dense flower-buds of a rich warm rose color.

PULTO'WA: see POLTAVA.

PULTUSK, *pŏl'tŏsk*: town of Poland, govt. of Lomza, in a thickly wooded district on the Narew, 35 m. N.N.E. of Warsaw. It contains numerous churches and a very large bishop's palace. Here, 1806, Dec. 26, was fought one of the battles of the campaign of Eylau, between the Russians and the French. The field was most obstinately contested, but the victory, which was claimed by both armies, inclined in favor of the French.— The town was destroyed by fire 1875. Pop. 19,946.

PULU, *pū'lō:* beautiful substance, resembling fine silk, of rich brown color and satin lustre, used largely as a styptic by the medical practitioners of Holland, and introduced into some other countries for the same purpose. It consists of the fine hairs from the stipes of one or more species of tree-fern, referable, without doubt, to the genus *Cibotium*. It was exported from Hawaii into Britain first in 1844, under the name Pulu, or vegetable silk, and was proposed as a substitute for silk in the manufacture of hats, but could not be applied. In 1856 it was exported from Singapore under the Malay names Penghawar Djambi and Pakoe Kidang, and was said to have been used in Dutch pharmacy for a long period as a styptic. Several importations into w. Europe have since taken place, and it has been successfully used. It acts mechanically by its great absorbent powers.

PULVERIZE, v. *pŭl'vĕr-īz* [F. *pulvériser*, to pulverize—from L. *pulverārĕ*, to reduce to powder—from *pulvis* or *pulvĕrem*, dust: It. *polvere*, powder]: to reduce to fine powder by beating or grinding. PUL'VERIZING, imp. PUL'VERIZED, pp. *-īzd:* ADJ. reduced to fine powder. PUL'VERIZABLE, a. *-ī-zā-bl*, that may be reduced to powder. PUL'VERIZA'TION, n. *-ī-zā'shŭn*, the act of reducing to fine powder. PUL'VERIZER, n. *-ī-zĕr*, a quartz-crusher; a machine for pounding substances to a powder. PUL'VERIN, n. *-ĭn*, the ashes of barilla.

PULVERMACHER-CHAIN, n. *pŭl'vĕr-mâk-ĕr-* [named after the inventor]: in *galv.*, form of battery consisting of a series of small wooden cylinders on which a zinc and a copper wire are coiled side by side, but without touching each other: the zinc of one cylinder, touching the copper of the adjacent one, forms a couple. The whole is immersed in vinegar diluted with water. A chain of 120 couples forms a very powerful battery.

PULVERULENT, a. *pŭl-vĕr'ū-lĕnt* [L. *pulvĕrŭlen'tus*, full of dust—from *pulvis* or *pulvĕrem*, dust], or PULVERACEOUS, a. *pŭl-vĕr-ā'shŭs*, or PULVEROUS, a. *pŭl'vĕr-ŭs* [L. *pulvĕrĕus*, full of dust]: consisting of fine powder; dusty; in *bot.*, covered with dust or fine powdery matter; powdery. PULVER'ULENCE, n. *-lĕns*, the state of being pulverulent; abundance of dust or fine powder.

PULVILLUS, n. *pŭl-vĭl'lŭs*, PULVILLI, n. plu. *pŭl-vĭl'lī* [L. *pulvillus*, a little cushion]: one of the cushions or suckers of the feet of insects, enabling them to walk on ceilings, etc., against the law of gravity.

PULVINATE, a. *pŭl'vĭ-nāt*, or PUL'VINATED, a. [L. *pulvīnātus*, cushion-shaped—from *pulvīnus*, a cushion]: in *bot.*, shaped like a cushion or pillow; cushioned; in *arch.*, enlarged or swelled in any particular part. PULVINUS, n. *pŭl-vī'nŭs*, in *bot.*, an enlargement like a swelling on the stem immediately below the leaf.

PULWUL, *pŭl-wŭl':* town of Brit. India, dist. of Gurgaon, in the Punjab, 36 m. s.-by-e. from Delhi, on the route to Muttra. Pop. (1868) 12,629.

PUMA, n. *pū'mă* [Peruvian], or COUGAR, *kō'gŭr* (*Felis concolor, Leopardus concolor,* or *Puma concolor*): one of the largest of American *Felidæ*, rivalled only by the jaguar; called sometimes the American Lion; though it is allied more to the leopard, notwithstanding its lack of spots and stripes. It is 4 to 4½ ft. in length from the nose to the root of the tail, and the tail about 2 ft. or 2½. The fur is thick and close, reddish brown above, lighter on the sides, and reddish white on the belly; the muzzle, chin, throat, and insides of the legs grayish white, the breast almost pure white. Young pumas have dark-brown spots in three rows on the back, and scattered markings elsewhere, exhibiting the relation to the leopards. The long tail of the P. is covered with thick fur, and is generally coiled up, as if it were prehensile, which it does not seem to be, though the P. climbs trees very well, and often descends on its prey from among their branches. The P. was found formerly in all except the coldest parts of America, but is now rare in most parts of N. America, having been expelled by man. It rarely attacks man, but is very ready to prey on domestic animals, and seems to have a thirst for blood beyond that of other *Felidæ*, one P. having been known to kill 50 sheep in a night, drinking a little of the blood of each. Yet it is easily tamed, and, when tamed, a very gentle creature, purring like a cat, and showing equal love of attentions. The geographical range of the P. extends far southward in Patagonia, and northward even to N. Y., though it is now never seen in any long-settled parts of N. America. In the Rocky Mt. forest regions, and w., it is often encountered. It is the Catamount or *Painter* (Panther) of N. American farmers. It sometimes issues from the forests, and roams over prairies and pampas, and is frequently caught with the lasso by S. American hunters.—A BLACK P. (*Felis nigra* of some naturalists), doubtful species, probably only a variety of the common P., is found in parts of S. America.

PUMICE, n. *pū'mĭs* or *pŭm'ĭs*, or PUMICE-STONE [It. *pomice;* Sp. *pomez*, pumice-stone—from L. *pumex* or *pumicem*, pumice-stone—akin to *spuma*, froth or foam] : a volcanic mineral or lava, light and porous, occurring generally with obsidian and porphyries. In chemical composition, it agrees with obsidian, of which it may be regarded as a peculiar form, rapidly cooled from a melted and boiling state. It is of white or gray color, more rarely yellow, brown, or black; and so vesicular, that in mass it is lighter than water, and floats in it. The vesicles, or cells, are often much elongated. P. often shows more or less filamentous structure; and it is said to be most filamentous when silica is most abundant in its composition. It is very hard and very brittle. It is much used for polishing wood, ivory, metals, glass, slates, marble, lithographic stones, etc., and in the preparation of vellum, parchment, and some kinds of leather. Among other purposes to which it is applied is the rubbing away of corns and callosities. Great quantities are exported from the Lipari Isles, which are in great part composed of P., occurring there, and in some other places, as a rock. P. is the chief product of some volcanic eruptions; but in some eruptions, none is produced. It is found also in regions where there are now no active volcanoes, as at Andernach on the Rhine. PUMICEOUS, a. *pū-mĭsh'ŭs*, composed of pumice; having the nature or appearance of pumice. PUMICIFORM, a. *pū-mĭs'ĭ-fawrm* [L. *fōrma*, a shape] : in the form of or resembling pumice, applied to light porous rock-products, seemingly the results of igneous action.

PUMMEL : see POMMEL 2.

PUMP, n. *pŭmp* [F. *pompe*; Icel. *pump:* Sp. and Port. *bomba;* Ger. *pumpe*, a pump : Low Ger, *pump*, a pestle : Sw. *pump*, a pump : an imitative word referring to the idea of splashing, and akin to *plump*] : a machine for raising water or other liquid, consisting of a tube, in which a piston and two valves work in those of the simplest description (see below) : V. to raise water or a liquid with a pump; *familiarly*, to elict or draw out from a person by artful questions, as information or secrets. PUMP'ING, imp. PUMPED, pp. *pŭmpt*. PUMP'ER, n. *-ĕr*, one who pumps. FORCE-PUMP, a more complicated machine than a common *lift-pump*, being fitted to raise water above the level to which it is driven by the pressure of the atmosphere. CHAIN-PUMP : see under CHAIN. PUMP-DALE, the wooden tube that carries off the water raised by a chain-pump. PUMP-GEAR, the materials or fittings of a pump. PUMP-ROOM, the room at a mineral well where the waters are drawn and drunk. PUMP-STOCK, the solid body of a common pump.

PUMP, n. *pŭmp* [probably the same word as POMP, which see, being so called because worn for 'pomp' or ornament] : a low shoe or slipper with a single sole, without a heel, and unwelted, chiefly used in dancing.

PUMP: machine for raising water and other fluids to a higher level. Pumps are divided into several classes according to their mode of action. Of these, as the most important, we describe the following: 1. The Lift or Suction P.; 2. The Lift and Force P.; 3. The Chain P.; 4. The Centrifugal P.; 5. The Jet-pump.

1. *The Lift or Suction Pump.*—The diagrams figs. 1 and 2 represent the ordinary suction pump. A is a cylinder, called the barrel; with it is connected at the bottom a pipe, B, which communicates with the water to be raised; and at its top is another pipe, C, which receives the water raised. In the barrel are placed two valves, D and E. D is fixed in position at the bottom of a barrel; E is attached to, and forms part of the piston F, which moves up and down the barrel when motive-power is applied to the rod G. The piston, or bucket, consists of a cylindrical piece of wood or metal, which fits exactly the barrel in which it moves, so that no water or air can pass between its circumference and the sides of the cylinder. This tight fitting is attained in wooden pistons by surrounding them with a leather ring; and in those of metal, by hemp or other packing, which is wrapped round a groove made in their outer surface. The hollow interior of the piston is closed at the top by the valve E, which is a kind of door opening on a hinge, at one side of it, in an upward direction, on the application of pressure, and shutting on to its seat on the piston when the pressure is removed. When opened, water or air can pass through it to the upper side of the piston; but when shut, none can pass from one side of the piston to the other. The other valve, D, is similar to it in all respects, except that, as before stated, it is fixed in the bottom of the barrel; it also can open only upward.

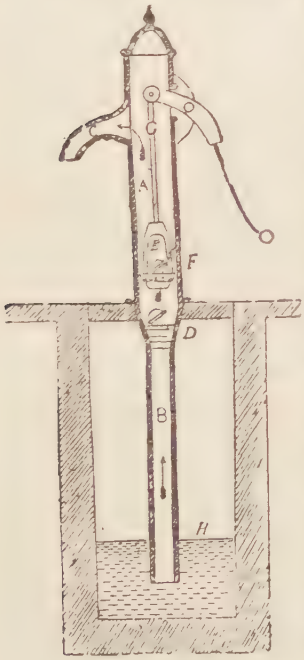


Fig. 1.

To describe the action of the pump, we shall suppose the piston to be at the bottom of the barrel, and the pump to contain nothing but air. On moving the piston up the barrel—the valve in it being shut, and kept so by

the atmospheric pressure above it—no air can pass from above it into the part of the barrel from which it is moving; the air contained in which becoming rarefied, by having to occupy a greater space, exerts less pressure on the valve D at the bottom of the barrel than the air in suction-pipe B below it. This valve is thus opened, and the air from the suction-pipe enters the barrel; so that when the piston has arrived at the top, a volume of air equal to the contents of the barrel has passed from the suction-pipe into the barrel. When the piston descends, it compresses the air in the barrel, which shuts the valve D; and when the density of the compressed air becomes greater than that of the atmosphere, the valve E in the piston is forced open, and the air in the barrel passes to the upper side of the piston. The next upward stroke of the piston again draws a like quantity of air from the suction-pipe into the barrel; and, as none of this air again enters the pipe, but is passed to the upper side of the piston by its downward stroke, the suction-pipe is by degrees emptied of the air it contained. During this process, however, motion has taken place in the water at the foot of the suction-pipe. The surface of the water at H is pressed upon by the weight of the atmosphere with a pressure of about 15 lbs. on every sq. inch; and by the laws of fluid-pressure, if an equal pressure is not exerted on the surface of the water in the suction-pipe, the water will rise in it until the pressure on its surface, plus the weight of its fluid column, balances the pressure of the atmosphere on the surface H outside; so that, as the air in the suction-pipe is rarefied, the water rises in it, until, when all the air is extracted from it, the water stands at the level of the valve D. By the next upward stroke of the piston, the barrel being emptied of air, the water follows the piston, and fills the barrel as it filled the suction-pipe. The pressure produced by the downward stroke shuts the valve D, and forces the water in the barrel through the valve E. The succeeding upward stroke carries this water into the pipe above, and again fills the barrel from the suction-pipe. In like manner, every successive upward stroke discharges a body of water equal to the content

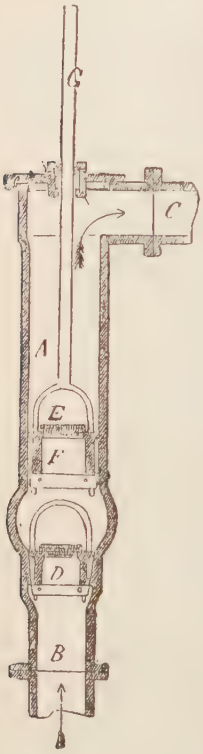


Fig. 2.

of the barrel into the pipe above it, and the pump will draw water as long as the action of the piston is continued.

The action of this P. may be more shortly described by saying that the piston withdraws the air from the barrel, and produces a vacuum, into which the water rushes through the suction-pipe, impelled by the pressure of the atmosphere on its surface. This atmospheric pressure balances a column of water of about 33 ft. in height; so that if the barrel be placed at a greater height than this from the surface of the water in the well, the water will not rise into it, and the P. will not draw.

With regard to its efficiency—that is to say, the relation between the power expended and the work produced, as measured by the water raised—it is to be noted

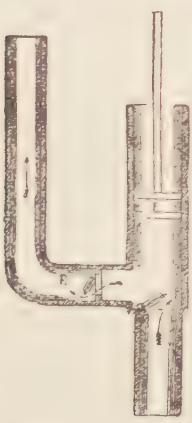


Fig. 3.

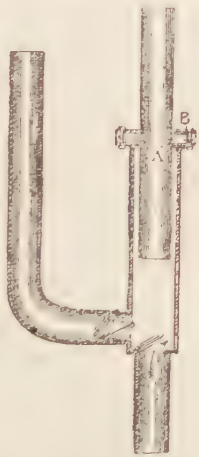


Fig. 4.

that the power is expended—1st, in raising the water through the required height; 2d, in overcoming the friction of the moving parts of the pump; 3d, in the friction and fluid resistance of the water in passing through the valves and pipes; 4th, in the losses arising from the lack of proper proportions between the various parts of the pump. The losses arising from these last sources are very great, and vary so much according to the construction of each particular P. that no useful estimate can be formed of the efficiency. We may say, however, that a P. of this description, to yield 50 per cent. of the applied power, must be well proportioned and carefully constructed.

2. *The Lift and Force Pump.*—Figs. 3 and 4 represent two varieties of this pump. That shown in fig. 3 is very similar to the suction-pump above described, except that the valve E instead of being fixed on the piston, is

placed in the discharge-pipe, the piston itself being solid. The water is drawn up into the barrel by suction in the manner just described in the suction-pipe, and then the pressure of the piston in its downward stroke forces it through the valve E, to any height that may be required. That shown in fig. 4 is provided with a different description of piston, called the plunger-pole. Its action is precisely the same as that of the other, except that the plunger-pole, instead of emptying the barrel at every stroke, merely drives out that quantity which it displaces by its volume. It is simply a solid rod of metal, A, moving through a water-tight stuffing-box B. This stuffing-box is made by placing, on a circular flange of metal, rings of india-rubber or other packing, the inner diameter of which is slightly less than that of the plunger-pole. On these is placed a ring of metal, and through the whole are passed bolts, which, on being screwed tight, force the packing tightly against the plunger-pole. It possesses many advantages, for the packing can be tightened and repaired without removal of the piston or stoppage of the pump; also, the cylinder is not worn by its action, nor does it require to be accurately bored out, as in the other form of pump.

In these pumps, the water is forced into the ascending pipe or column only on the downward stroke; it will thus be discharged in a series of rushes or jerks. As it is a great object to procure a continuous discharge, both for convenience, and for saving of the power wasted by a continual acceleration and retardation of the ascending column, various methods have been used for that purpose. The most common is the reservoir of air, which is an air-tight receptacle fixed vertically on the discharge-pipe; the water forced into the pipe by the down-stroke compresses this air, which, acting as a spring, returns this force to the ascending column during the period of the up-stroke, and so, by taking the blow of the entering water, and returning it gradually, equalizes the pressure, and renders the discharge uniform. Another method is the double-action force-pump, by which equal volumes of water are forced into the ascending column by both up and down strokes. An example of this is shown in fig. 5. The solid piston A is worked by a rod B of half the section of the piston itself. During the up-stroke, the upper surface forces a volume of water into the ascending column, and the lower surface draws

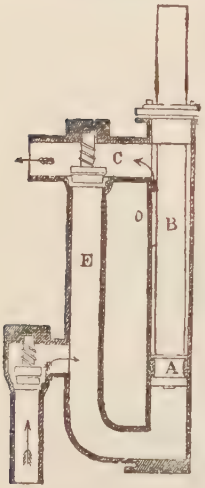


Fig. 5.

in twice that volume. In the down-stroke, these two volumes are sent through the pipe E into the receptacle C, communicating with the upper face of the piston One of the volumes fills the space D, which would otherwise be left empty by the descent of the piston; the other volume is sent into the ascending column; so that a volume of water equal to half the contents of the barrel is sent into the ascending column by both the up and the down strokes.

A P. exhibited in the International Exhibition of 1862, by Farcot & Sons, attains this object in a much more simple manner. In it 'two equal pistons, with valves affording very large water-ways, work parallel to each other in two pump cylinders. During the successive strokes, the first piston draws in water by its upper surface, and delivers it to the ascending column by causing it to traverse the second piston. In its ascending course, the second piston raises in its turn the column of water by its upper face, while the lower face sucks the water, causing it to traverse the first piston.' It will be seen from this description that a valve is placed in each piston, that the cylinders communicate at their base, and that the pistons make their strokes simultaneously.

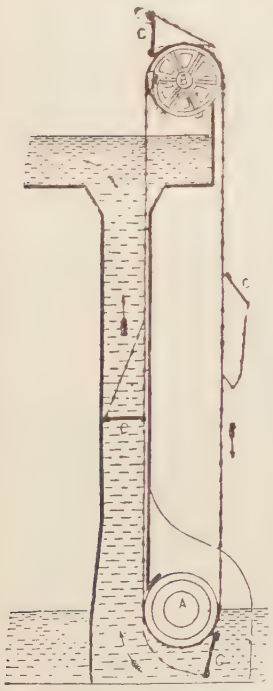


Fig.6.—Murray's Chain-pump.

In spite of the great antiquity of the lift and force P. it is only of late years that improvements in its construction have rendered it an efficient machine—i.e., one which returns in the shape of water raised, a good proportion of the power applied to it. In 1849, Morin found by experiments that the power lost was 55 to 82 per cent.—i.e., that of the motive-power, 45 per cent. was yielded in the best and 18 in the worst, giving an average of about 30 per cent. In 1851, the jury, reporting on those exhibited in the Great Exhibition, say that it is one of the poorest machines, considered in a mechanical sense, as a means of producing a given result with the least possible expense of power. Those exhibited in the International Exhibition of 1862 showed marked improvement.

3. *The Chain-pump.*—This P. is formed in general of plates of wood fastened to an endless iron chain, and moving upward in a rectangular case or box. Fig. 6, shows an example, in the International Exhibition of 1862, called 'Murray's Chain-pump;' much used on public works, on account of the ease of its construction and erection, and its admirable efficiency even at considerable heights. In this P. the friction is reduced by having only 3 or 4 lifts instead of 20 or 30, as previously. The chains pass under a roller, A, at the foot, and are driven by a small pitch-wheel, B, at the top, over which they are conducted, and which is driven by appropriate gearing. The lifts feather in passing over the wheel to the descending side, and only unfold when brought round to the ascending side; thus the P. is enabled to take off the water with the same dip as other pumps. The P. is not liable to be choked, as a back turn of the chain immediately releases any substance getting between the lift and the barrel. The speed is variable, in proportion to the duty required: the chain is ordinarily worked 200 to 300 ft. per minute. The greatest lift yet made by Murray's chain-pump is 60 ft. high; but it is considered that 100 tons of water per minute could be raised 100 ft. high. From 10 to 12 ft. apart has been found to be the best pitch for the lifts; putting them nearer needlessly increases the friction.

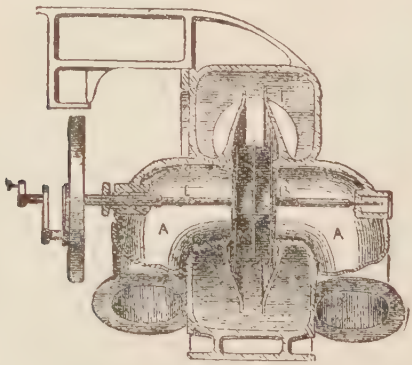


Fig. 7.

Experiments by Lovick for the Metropolitan Board of Works (London) showed that the slip of the lifts which work in the barrel, and are one-eighth of an inch shorter each way than the barrel, averaged 20 per cent. of their motion, and that the useful work done averaged 63 per. cent. of the indicator horse-power of the engine working it.

4. *The Centrifugal Pump.*—These pumps, with reference to those previously described, may be called new, as, though they have been in use in one form or another for at least a century, their merits were not made prominent till 1851, when the great efficiency of the models exhibited by Appold, Gwynne, and Bessemer drew general attention.

The essential parts of this P. are—1.-The wheel to which the water is admitted at the axis, and from which it is expelled at the circumference, by the centrifugal force due to the rotatory motion imparted to it in passing through the rapidly revolving wheel; 2. The casing or box in which the wheel works, and by which the entering water is separated from that discharged.

Figs. 7 and 8 are a section and plan of a centrifugal pump. The water enters by the supply-pipes A, A, which lead to the central orifices of the wheel B, B; it then passes through the passages, C, C, formed by the vanes and the side covering-plates, D, of the wheel. In passing through these passages of the wheel, which is made to revolve by power applied to the shaft E, it acquires a rotatory motion, which continues when it leaves the circumference of the wheel, and enters the circular whirlpool chamber F; so that the interior of the pump may be regarded as a whirlpool, extending from the axle of the wheel to the circumference of the whirlpool chamber. Into this whirlpool the water is drawn at the central orifice of the wheel, and discharged by the pipe G at the circumference of the whirlpool chamber; and the force with which it is discharged, or the height to which it will rise in the pipe G, is measured by the centrifugal force of the water revolving in the whirlpool.

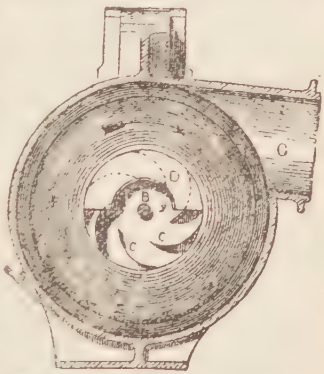


Fig. 8.—Thomson's Centrifugal Pump.

With reference to the efficiency of these pumps, it is impossible to give accurate estimate, since as high as 70 per cent. of the applied power is claimed to be returned by forms of the P. shown in figures 7 and 8, while some other descriptions experimented on 1851 gave only 18 per cent. of useful effect.

It is evident, from the above description of the P., that the height to which the water will be raised depends entirely on the speed of revolution of the wheel; and it is by this that the application of centrifugal pumps is limited to comparatively low lifts of, say, less than 20 ft.,

as the speed for high lifts requires to be greater than can be conveniently and usefully attained in practice. They are best applied when raising large quantities of water through low lifts. It will be observed also that on account of the simplicity of their parts, and the absence of valves, they are much less liable than other pumps to be choked by entrance of solid materials. In some descriptions of this P., the exterior whirlpool chamber is dispensed with; and to the vanes of the wheel is given such a curvature backward from the direction of motion, that the water leaving the circumference of the wheel is spouted backward from the vane-passages with a speed equal to that of the wheel in the opposite direction, so that it has only a radial motion with reference to a fixed object; in other words, that the force is acquired from the radial component of the pressure of the vanes, instead of the centrifugal force of the revolving water. Those pumps, however, give the best results which, as the one above described, combine both actions. In all cases, curved vanes are much superior to straight ones.

5. *The Jet-pump.*—This P. is worked by water-power, and is notable for the extreme simplicity of its parts, not requiring an attendant while in operation.

Fig. 9 is a representation of this pump, C is the water which it is required to raise to the level of the water D, and B is the water in the stream available for working the pump. The water B passes down the pipe A, and is discharged from the jet or nozzle, E, into the conical pipe F. Round the nozzle is the vacuum-chamber G, at the bottom of which is attached the conical pipe F, and into the side of which the suction-pipe H enters from the water to be pumped. The water passing from the nozzle into the conical pipe, carries air with it, and thus gradually forms a vacuum in the chamber G, when the water rises into it from the level C, through the pipe H; and it is in turn carried with the jet down the conical pipe into the discharge-level D. The velocity of the water coming from the jet is gradually retarded by the action of the conical pipe, the speed decreasing as the area of section increases; and the *vis viva* of its motion is by this retardation converted into a sucking force, draw-

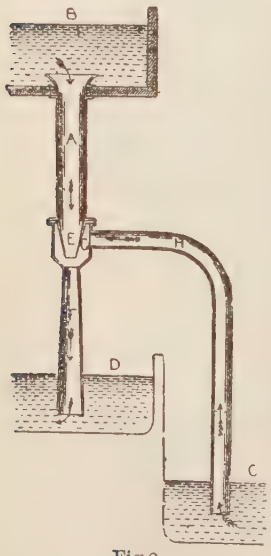


Fig.9.

ing the water from the suction-pipe through the vacuum chamber into the conical pipe. The water issuing from the jet will have a speed equal to that produced by a column of the height BC, or the sum of the fall and lift. This P. may be viewed, for purposes of explanation, as a siphon, into the shorter leg of which a jet of water is injected, which overcomes the pressure due to the difference of levels, and reverses the ordinary motion of the water in a siphon. An efficiency of 18 per cent. has been obtained from it, which is low, as compared with that obtained from other descriptions of P.; yet in cases where waste of water-power is not so much to be avoided, as expense in erecting, working, and maintenance, these pumps possess decided advantages. The case to which they are peculiarly applicable is the drainage of marshes, which have streams of water adjacent to them descending from a higher level.

PUMPELLY, *pŭm-pĕl'ĭ* RAPHAEL: geologist: born Owego, N. Y., 1837, Sep. 8. He was educated in Paris, Hanover, and Freiberg; made careful observations in the mining districts of Europe, returned to this country 1860 and became interested in mining in Arizona. The following year he entered the service of the govt. of Japan to determine the mineral resources of the island of Yesso, and 1863 was employed to survey the coal regions of n. China. He become prof. of mining engineering in Harvard University 1866, surveyed the copper reigons of Mich. 1870, was geologist of the state of Mo. 1871–74, and had charge of investigations of the mining industries of the country, except the precious metals, for the 10th census. He has since been employed by the govt. as a geologist, and has made various surveys. He is a member of the National Acad. of Sciences and of other scientific societies, and has written many geological reports and articles for scientific journals. Among his books are *Geological Researches in China, Mongolia, and Japan* (1866); and *Across America and Asia* (1869).

PUMPER-NICKEL, n. *pŭm'pĕr-nik-ĕl* [Ger.]: a species of coarse bread, made from unbolted rye—the chief food of the Westphalian peasants. It is slightly acid, but very nourishing.

Pumpkin (*Cucurbita pepo*).

PUMPKIN, n, *pŭmp'kĭn*, formerly POMPION, n. *pŏmp'yŭn*, or PUMPION, n. *pŭmp'yŭn* [OF. *pompon;* a melon—from L. *pepo;* Gr. *pepōn*, a melon: comp. W. *pump*, a round mass]: well-known species of gourd — the *Cucur'bĭta pepo*, ord. *Cucur'bĭtăcĕæ;* also its fruit: see GOURD.

PUN, n. *pŭn* [OE. *pun*, to pound, as if hammering on the word: perhaps connected with Gael, *bun*, root or foundation]: play upon words, founded on their agreement or resemblance in sound, with difference in meaning, and accomplished by applying the words in an odd or ludicrous sense; a kind of wit by quibbling on words. The wit—such as it is—is in the equivocal sense of some particular expression, by means of which an incongruous, and therefore ludicrous idea is unexpectedly shot into the sentence. E.g., a noted punster was asked, with reference to Carlyle's writings, if he did not like 'to expatiate in such a field.' 'No,' was the rejoinder; 'I can't get over the *style*' (stile).—A lady in an eastern state complaining to a friend that her husband (whose business had taken him to the far west) constantly sent her letters filled with expressions of endearment, but no money, was told, by way of comfort, that he was giving her a proof of his *unremitting* affection. PUN, v. to make or utter puns; to quibble on words, PUN'NING, imp. PUNNED, pp. *pŭnd*. PUNSTER, n. *pŭn'stĕr* one who puns or is skilled in punning.

PUNA, n. *pū'nă*: a term applied to the cold desiccating winds of the higher Andes sweeping the high barren table-land called the *Puna*.

PUNCH, n. *pŭnsh* [Low Ger. *bunsen*, to knock so that it sounds: prov. Dan. *pundse*, to butt like a ram]: a stroke or thrust with the fist: V. to strike or thrust with the fist. PUNCH'ING, imp. PUNCHED, pp. *pŭnsht*. PUNCH'ER, n. *-ĕr*, one who punches.

PUNCH, n. *pŭnsh* [Bav. *punzen*, a short and thick person or thing, a cask; *punzet*, short and thick; *punz*, a cask: Gael, *bunach*, squat, short]: a short thick fellow; a stage-puppet, which is really a corruption of Italian *pulcinella*, the later form being *punchinello* the fool in a play. PUNCHY a. *pŭnsh'ĭ*, short and thick or fat.—*Punch* is the chief character in a popular comic exhibition performed by means of *Puppets* (q.v). Various accounts are given of the origin of the name. The exhibition is of Italian origin. According to one story a peasant, a well-known character in the market-place of Naples, got the name Pulcinella from dealing in fowls (*pulcinelli*), and after his death was personated in the puppet-shows of the San-Carlino Theatre. Another account makes the word a corruption of Puccio d'Aniello, the name of a witty buffoon of Acerra, who joined a company of players and became the favorite of the Neapolitan populace. Others give his original name as Paolo Cinella. The variety and inconsistency of the legends show them to be myths—histories invented to account for the name. The modern P. is only a modification of an ancient Mask (q.v.) seen represented on ancient vases, and taken perhaps from the Oscan Atellanæ; and the Italian name is to all appearances a diminutive of *pollice*, the thumb—**Tom Thumb** (the

dwarfs of northern mythology are sometimes styled *däumline,* thumkins). The English name *Punch* is apparently identical with Eng. *paunch;* and denotes anything thick and short. The name *Punchinello* seems to have arisen from blending the English and Italian names.

The drama or play in which the modern P. figures, is ascribed to an Italian comedian, Silvio Fiorillo, about 1600. The exhibition soon found its way into other countries, and was very popular in England in the 17th c. Its popularity seems to have reached its height in the time of Queen Anne; and Addison has given in the *Spectator* a regular criticism of one of the performances. The scenes as now given by the itinerant exhibitors of the piece are much shortened from what were originally performed, in which allusions to public events of the time were occasionally interpolated. The following is an outline of the plot as performed 1813. Mr. P., a gentleman of great personal attraction, is married to Mrs. Judy, by whom he has a lovely daughter, but to whom no name is given in this piece, the infant being too young to be christened. In a fit of horrid and demoniac jealousy, P., like a second Zeluco, strangles his beauteous off-spring. Just as he has completed his dreadful purpose, Mrs. Judy enters, witnesses the brutal havoc, and *exit* screaming; she soon returns, however, armed with a bludgeon, and applies it to her husband's head, 'which to the wood returns a wooden sound.' P. at length exasperated seizes another bludgeon, soon vanquishes his already-weakened foe, and lays her prostrate at his feet; then seizing the murdered infant and the expiring mother, he flings them both out of the window into the street. The dead bodies having been found, police-officers enter the dwelling of P., who flees for his life, mounts his steed; and the author neglecting, like other great poets, the confining unities of time and place, conveys his hero into Spain, where, however, he is arrested by an officer of the terrible Inquisition. After enduring the most cruel tortures with incredible fortitude, P., by means of a golden key, opens his prison-door, and escapes. The conclusion of the story is satirical, allegorical, and poetical. The hero is first overtaken by Weariness and Laziness in the shape of a black dog, which he fights and conquers; Disease, in the disguise of a physician, next arrests him; but P., 'sees through the thin pretense,' and dismisses the doctor with a few derogatory kicks. Death at length visits the fugitive; but P. lays about his skeleton carcass so lustily, and makes the bones of his antagonist rattle so musically with a bastinado, that 'Death his death's blow then received.' Last of all comes the Devil; first under the appearance of a lovely female, but afterward in his own natural shape, to drag the offender to the infernal regions, to expiate his dreadful crimes. Even

this attempt fails, and P. is left triumphant over Doctors, Death, and the Devil. The curtain falls amid the shouts of the conqueror, who, on his victorious staff, lifts on high his vanquished foe. The whole performance is artistically wretched, and ethically degrading.

The well-marked peculiarities in the original personification of P., which were a high back, distorted breast, and long nose, were intended to give increased zest to his witticisms; but these features have been much exaggerated in the now well-known illustrations of popular periodicals bearing his name.

The performance of P., as generally represented, requires the assistance of only two persons—one to carry the theatre and work the figures, the other to bear the box of puppets, blow the trumpet, and sometimes keep up the dialogue with the hero of the piece. The movements of the puppets are managed simply by putting the hands under the dress, making the second finger and thumb serve for the arms, while the forefinger works the head.

PUNCH, n. *pŭnsh* [said to be derived from the Hind. *panch*, five—so called, as compounded of five ingredients —arrack, tea, sugar, water, and lemon juice]: beverage introduced from India into England, thence to the English colonies in America. PUNCH-BOWL, a vessel in which punch is made, or from which it is drunk.—*Punch*, as now prepared, is a drink, the basis of which is alcohol, of one or more kinds, diluted with water, flavored with lemon or lime-juice and spices, and sweetened with sugar; sometimes other ingredients are added according to taste, especially wine, ale, milk, or tea. The mixture is usually compounded in a large china bowl made for the purpose, and is served out in glasses by means of a ladle. This regular P. is much more rare than formerly; which is not to be regretted, for a more unwholesome or intoxicating beverage could hardly be compounded. The ordinary mixed P. consists of the following ingredients: the juice of three lemons squeezed out into a large jug, and one lemon cut into slices, with the rind on for flavor, twelve ounces of loaf-sugar, and two quarts of boiling water; after being infused half an hour, and strained off, the liquid is poured into the punch-bowl, and half a pint of rum and of brandy are added. One mode of drinking this composition is as a liqueur after fish at dinner, for which purpose it is bottled, and when wanted, is iced, either by placing the bottles in rough ice, or by pounding and mixing in fine ice. The principal varieties of P. in addition to this, are rum, gin, and brandy punches, in which only one of the spirits mentioned is used; and champagne, milk, orange, raspberry, tea, wine punches. The P. now offered is usually of some mild kind.

PUNCH, n. *pŭnsh* [It. *punzione*, a puncture: F. *poinçon*, a bodkin, a stamp: Sp. *punchar*, *punzar*, to sting, to prick: L. *punctus*, pricked, stung—from *pungĕrĕ*, to prick: Dut. *pontsen*, to punch]: tool of iron or steel for piercing holes by stamping out a piece: V. to perforate or pierce with a steel tool by stamping out a piece. PUNCH ING, imp. PUNCHED, pp. *pŭnsht*. PUNCH'ER, n. *-ĕr*, one who or that which punches.—A *Punch* is a tool for cutting circular or other-shaped pieces out of metal, wood, or other materials. The simplest form is shown in fig. 1, which consists of

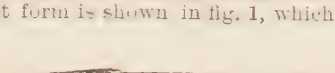


Fig. 1.

a piece of steel formed at one end into a hollow cylinder, *a*, the end of which at *b* is ground to a very sharp cutting-edge. The other end of the punch at *c* is made strong and thick, to receive blows from a hammer, and to serve as a handle. When the instrument is in use, the cutting-edge, *a*, is applied to the surface which is to be perforated, and a blow sufficiently hard is struck on the end of the handle, *c*, when a circular piece of the material is cut out and left in the hollow part, *a*, which can be removed at the upper end of the opening at *d*. The mode of manufacturing such tools is very simple. A piece of square steel-bar is taken, whose thickness must correspond with the thickness of the handle at *c*, fig. 1, for which fig. 2 may be taken as the commence-

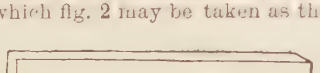


Fig. 2.

ment. This is brought up to a sufficient heat in the furnace, and is then beaten or rolled laterally so as to have the shape in fig. 3. In the next stage, the edges, *a*, *a*, fig. 4, are brought up; and finally a mandril is put

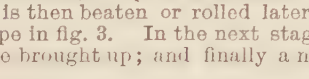


Fig. 3.

into the groove thus made, and the edges are brought together, and welded: the mandril is then withdrawn, and the tool goes to be ground and finished. It is obvious that, by skill, punches may be made which will make holes of almost any shape. The enormous

development of iron manufactures has necessitated the use of machine-tools instead of those made for the hand, and none of the ingenious inventions for this purpose have been much more important than the *punching-machines*, for without them the labor of drilling holes in iron plates for such objects as steam-boilers, iron ships,

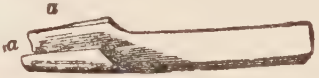


Fig. 4.

bridges, and other great works, would have been so great as to prevent them from being undertaken. The punching-machine invented by Roberts and Nasmyth, with recent improvements, is in general use in great engineering works; its essential parts are the punch, lever, and the spring. The P. is simply a piece of tough, hard steel of cylindrical form, and of the size of the intended holes; it fits into a socket suspended over a fixed iron plate or bench, which has a hole exactly under the punch, and exactly fitting it. In the socket which holds the P. is a coiled iron spring, which holds up the P., and allows it to descend when the power is applied, and returns it when the pressure is relieved. The lever, when in action, presses on the top of the P., and the plate of metal which is to be perforated, being placed on the iron bench, receives the pressure of the P., with sufficient force to press out a disk of metal exactly the diameter of the P., which falls through the hole in the iron bench. The lever is moved by a cam on a powerful wheel, which presses on it until it can pass; then the lever being relieved, the P. is drawn up by the spring in its socket, ready to receive the action of the cam when the revolution of the wheel again brings it to bear on the lever. The P. itself is always solid, differing entirely in this respect from the hand-tools. This machine perforates thick plates of iron, such as are used for ship-building, almost as quickly as a workman with an ordinary hand-punch could perforate thin plates of tin; the holes made are quite true, and are ready to receive the rivets.

PUNCH, or the LONDON CHARIVARI, *shâ-rē-vâ-rē*: principal English comic journal; a weekly magazine of wit, humor, and satire in prose and verse, copiously illustrated by sketches, caricatures, and emblematical devices. It draws its materials as freely from the most exalted spheres of foreign politics as from the provincial nursery; and, dealing with every side of life, is not less observant of the fashionable follies of Belgravia than of the uncouth life of Whitechapel. P. gives due place to Irish bulls and dry Scotch humor, and does its best to present them in the raciest vernacular. Stern in exposure of sham and vice, P. is not unkindly in its merriment over innocent foibles. Usually a *censor*

morum in the guise of Joe Miller, a genial English Democritus who laughs and provokes to laughter, P. at times weeps with those that weep, and, *jocis remotis*, pays a poetical tribute to the memory of the departed great. This wittiest of serial prints was founded 1841, and, under the joint editorship of Mark Lemon and C. Shirley Brooks (q.v.), soon became a household word; while its satirical cuts and witty rhymes were a power in the land. P. is recognized as an English institution, and in corners of Europe where an Englishman rarely comes, the frequenters of the café may be seen puzzling over the esoteric wit and wisdom of Cocaigne. Contributions to P. helped to give fame to Douglas Jerrold (q.v.), Tom Hood (q.v.), Albert Smith, and Thackeray (q.v.); as its illustrations have done for their designers, Doyle, Leech, Tenniel, Du Maurier, and Keene. This comic paper has done service in purifying the moral standard of current wit in England.—For the alternative name, see CHARIVARI.

PUNCHEON, n. *pŭnsh'ŭn* [F. *poinçon*, a bodkin, a kingpost, a puncheon: It. *punzone:* Ger. *bunzen*, a cask (see PUNCH 2)]: a small steel instrument used for cutting, piercing, or stamping a body; a measure of liquids containing 84 gallons; in *carpentry*, a short piece of timber placed to support a great weight, now called a *stud* or *quarter*.

PUNCHINELLO, n. *pŭnsh'in-ĕl'lō* [It. *pulcinella*, or *polecinella*, from which is derived F. *polichinelle*, Punch]: a buffoon; in the *puppet-show*, a short, thick, hump-backed puppet: see PUNCH.

PUNCTATE, a. *pŭngk'tāt*, or PUNC'TATED, a. *-tā-tĕd* [mid. L. *punctātus*, marked with punctures—from L. *punctum*, a point, a small hole—from *pungo*, I puncture]: pointed; in *bot.*, having the surface covered with small holes or dots. PUNC'TIFORM, a. *-tĭ-fawrm* [L. *forma*, shape]: having the form of a point.

PUNCTILIO, n. *pŭngk-til'yō* or *pŭngk-til'ĭ-ō* [Sp. *puntillo*, a small point—from *punto*, a point: It. *puntiglio*, the point of honor—from L. *punctum*, a point]: a nice point in behavior or ceremony; great exactness or particularity in forms. PUNCTIL'IOUS, a. *-yŭs*, very nice or exact in the forms of behavior, etc.; exact to excess in the observance of rules or customs. PUNCTIL'IOUSLY, ad. *-yŭs-lĭ*. PUNCTIL'IOUSNESS, n. *-nĕs*, the quality of being punctilious; great exactness in nice forms of ceremony and behavior.

PUNCTO, n. *pŭngk'tō* [L. *punctum*, a point]: in *OE.* nice point of ceremony; a point in fencing.

PUNCTUAL, a. *pŭngk′tū-ăl* [mid. L. *punctuālis*, punctual—from L. *punctum*, a point: It. *puntuale*: F. *ponctuel*, exact]: accurate; done at the exact time; exact in the observance of time, appointments, or promises; in *OE.*, comprised in a point, spot, or narrow compass. PUNC′TUALLY, ad. *-lĭ*. PUNC′TUAL′ITY, n. *-ăl′ĭ-tĭ*, or PUNC′TUALNESS, n. *-nĕs*, the quality of being punctual; scrupulous exactness as to time. PUNC′TUALIST, n. *-ĭst*, one who is exceedingly exact in observing forms and ceremonies.

PUNCTUATE, v. *pŭngk′tū-āt* [mid. L. *punctuātus*, defined—from L. *punctum*, a point or dot: F. *ponctuer*, to make stops]: to mark off portions of written language by points or stops to render the meaning easy of apprehension, and to indicate pauses or rests for the voice. PUNC′TUATING, imp. PUNC′TUATED, pp. PUNC′TUA′TION, n. *-ā′shŭn*, art of marking off portions of written language by points or stops (see below). PUNC′TUIST, n. *-ĭst*, one who is skilled in punctuation.

PUNCTUA′TION: division of a writing into sentences, and sub-division of these into parts, by means of certain marks called *points*—a great help to the clear exhibition of the meaning and to the pleasant reading of what is written. The ancients were not acquainted with the use of points, or used them very little, and only for oratorical purposes. P. according to the grammar and sense is said to have been an invention of the Alexandrian grammarian Aristophanes; but was so much neglected and forgotten, that Charlemagne found it necessary to ask Warnefried and Alcuin to restore it. It consisted at first of a point called the *stigma*, and sometimes a line, variously formed and introduced. The system of P. now in use was introduced by the Venetian printer Manutius, in the latter part of the 15th c.; the example was soon and generally followed, and little change has since been found requisite.

PUNCTURE, n. *pŭngk′tūr* [L. *punctūra*, about to puncture; *punctum*, a small hole, a point—from *pungo*, I puncture: It. *puntura*, a pricking]: a small hole or wound made by a pointed instrument: V. to pierce with a small pointed instrument. PUNC′TURING, imp. PUNC′TURED, pp. *-tūrd*.

PUNDERPUR, or PANDHARPUR, *pŭn-dĕr-pôr′*: town of Brit. India, dist. of Sholapur, presidency of Bombay, 90 m. e. from Satara, on the right bank of the Bima, a large branch of the Kistna. It is highly revered by the Hindus, on account of a celebrated temple dedicated to an incarnation of Vishnu. Pop. (1881) 16,910.

PUNDIT: see PANDIT.

PUNDLER, *pŭnd′lĕr*: formerly a name in Scotland for a person employed on an estate as hedger, ditcher, forester, and general guardian, in absence of the proprietor.

PUNG, n. *pŭng*: in *N. Amer.*, a rudely made one-horse sleigh.

PUNGENT, a. *pŭn'jĕnt* [L. *pungens* or *pungen'tem*, causing a pricking or stinging sensation—from *pungĕrĕ*, to prick: It. and Sp. *pungente*, pricking, pungent]: sharp; stinging or pricking; sharp on the tongue; sharp-tasted; biting; acrimonious; sarcastic. PUN'GENTLY, ad. *-lĭ*. PUN'GENCY, n. *-jĕn-sĭ*, the quality of being pungent or pricking, as to the taste; acrimoniousness; keenness, as of wit.—SYN. of 'pungent': sharp; piercing; acrid; penetrating; acute; acrimonious; biting; stinging; keen; pricking.

PUNIC, a. *pū'nĭk* [L. *Punĭcus*, pert. to Carthage—from *Pœni*, the Carthaginians]: pert. to the Carthaginians; thence faithless; treacherous: N. the language of anc. Carthage. PUNICA FIDES, *pū'nĭ-kă fī'dēz* [L. Punic faith]: the faith of the Carthaginians, whom the anc. Romans, not without reason, believed never sincerely meant to keep any treaty of peace, and whom they therefore stigmatized as unfaithful and perfidious—hence treachery; perfidiousness. PUNIC WARS, the three great wars waged for supremacy between Rome and Carthage. The Latin word *punicus*, or *pœnicus*, was the name given by the Romans to the Carthaginians, in allusion to their Phœnician descent. For an outline of the struggle between the two rival powers, see CARTHAGE: ROME: HAMILCAR: HANNIBAL: also the SCIPIOS.

PU'NICA: see POMEGRANATE.

PUNINESS: see under PUNY.

PUNISH, v. *pŭn'ĭsh* [F. *punissant*, punishing—from *punir*, to punish—from L. *punīrĕ*, to punish; *pœna*, punishment: It. *punire*]: to afflict with pain, suffering, loss, or any calamity, as a penalty for a fault or crime, or with a view to amendment; to correct; to chasten; *familiarly*, to inflict a severe beating, as in a prize-fight. PUN'ISHING, imp. PUN'ISHED, pp. *-ĭsht*. PUN'ISHER, n. *-ĕr*, one who inflicts punishment. PUN'ISHABLE, n. *-ĭsh-ă-bl*, worthy of punishment; capable of being punished by law or right; liable to be punished. PUN'ISHABLY, ad. *-blĭ*. PUN'ISHMENT, n. *-mĕnt*, the infliction of suffering for a crime or fault; the suffering inflicted (see PUNISHMENT, in Law: PUNISHMENTS, MILITARY AND NAVAL): chastisement. PUNITIVE, a. *pū'nĭ-tĭv*, awarding or inflicting punishment; that punishes or tends to punish. PU'NITORY, a. *-tĕr-ĭ*, punishing; tending to punishment. FUTURE PUNISHMENT (see HELL).—SYN. of 'punish': to chastise; correct; discipline; castigate; scourge; whip; lash; chasten; afflict.

PUN'ISHMENT, in Law: usually deprivation of property or liberty, or infliction of pain on the body of one who commits a criminal offense. It is not applicable, generally, to civil actions, though these also are followed by compulsory payment of money, or, failing this, by deprivation of property and liberty. As the legal consequence of crimes, P. consists chiefly of infliction of pain on the body, and this ranges from capital P., or death, down to imprisonment, and, in some cases, whipping is added; and in military and naval offenses (in some countries), flogging. Capital P. is inflicted only in case of treason and murder (but there are other instances under naval or army discipline), and in the form of Hanging (q.v.): see EXECUTION OF THE DEATH SENTENCE: CAPITAL PUNISHMENT. In crimes of less degree, imprisonment, or Penal Servitude (q.v.) for a term of years, is the P. As a general rule, the judge is given discretion to fix the P. within two defined limits. In the great mass of the smallest crimes, cognizable by justices of the peace, and frequently termed offenses punishable summarily, the usual P. is a fine or penalty—i.e., a sum of money is ordered to be paid by the offender, and if he do not pay it, his goods are sold to make up the sum; failing which, he is committed to the house of correction for a period of 3, 6, or 12 months; but, in some of the cases, imprisonment and hard labor are imposed in lieu of a fine. The president, governor of a state (or other chief executive or board if specially appointed)—each in his respective sphere—can put an end to a sentence of P. by a free pardon, or may commute a sentence of death to imprisonment for life.—See PRISONS—PRISON DISCIPLINE.

PUNISHMENTS, MILITARY AND NAVAL: penalties inflicted usually according to a special code. Desertion from the army or navy is punishable in nearly the same manner by all nations: with death, or such other penalty as a court-martial may direct, in time of war; and with any penalty, excepting death, which a court-martial may direct, in time of peace. In nearly all other instances of offense against discipline, morality, or the good of the service, the offenses are variously specified and provided with various penalties. Flogging, permitted in the British service; striking with a cane, stick, or flat of the sword, permitted in the German service; and branding, occasionally practiced elsewhere—all are forbidden as punishments in the U. S. army and navy. The various grades of offense and their penalties prescribed for the U. S. army are detailed in *Regulations for the Government of the Army* (*U. S. Revised Statutes*, 1878), sec. 1342–61, and vary with the rank of the offender, his location at the time of the offense, and the time of the offense, whether committed during war or peace. The respective rights of the civil and milit. authorities in the case of a civil or criminal offense committed by an officer or soldier of the army, during peace or war, are also there set forth.—In the *Regulations for the Govern-*

ment of the Navy (*U. S. Revised Statutes*), it is provided (sec. 1624, art. xxiv.) that no commander of a vessel shall inflict on any commissioned or warrant officer any other punishment than (1) private reprimand, (2) suspension from duty, (3) arrest, and (4) confinement; and that he shall not inflict nor cause to be inflicted on any petty officer, person of inferior rating, or marine, any other than one of the following punishments: (1) reduction of any rating established by himself; (2) confinement, with or without irons, single or double, not exceeding 10 days, unless further confinement is necessary, as in the case of a person to be tried by court-martial; (3) solitary confinement, on bread and water, not exceeding 5 days; (4) solitary confinement, not exceeding 7 days; (5) deprivation of liberty on shore; (6) extra duties. No other punishments are permitted on board naval vessels, except by sentence of a general or summary court-martial.

PUNITIVE, PUNITORY: see under PUNISH.

PUNJAB, or PANJAB, *pŭn-jâb'*, THE [from two Persian words signifying 'five rivers:' the *Pentapotamia* of the Greeks]: extensive territory in n.w. Hindustan, watered by the Indus and its five great affluents—the Jhelum, Chenab, Ravi, Beas, and Sutlej; a British possession since 1849. It is bounded w. by the Suliman Mountains, n. by Cashmere, and e. and s.e. by the Sutlej; extreme length about 800 m., width about 650 m. The area under direct Brit. administration is 106,632 sq. m.; that of native states under Brit. control is 35,817; but including Cashmere, etc., the total area is about 220,000 sq. m. Pop. of the Brit. possessions (1868) 17,611,498; (1881) 18,850,437 (1891) 20,803,000. The cap. of the province is Lahore, but the largest town is Delhi (formerly in the N. W. Provinces). The length of roads is 20,798 m.; railways open, 712 m. (see Eastwick's *Handbook to the P.*, 1883). The physical character of the n. contrasts strikingly with that of the s. districts. In the n. the whole surface is traversed by spurs from the Himalayas, which inclose deep valleys. In the s. the surface is unbroken by any important eminence, except the Salt Range, 2,000 to 5,000 ft. high, between the Indus and the Jhelum. The country, divided into five doabs, or interfluvial tracts, and frequently spoken of as the plains of the Indus, has a general slope toward the s.w. The climate in the plains is most oppressively hot and dry in summer, reaching in May 115° to 121° in the shade at several stations; but cool, and sometimes frosty, in winter. Little rain falls except in the districts along the base of the Himalayas. The soil varies from stiff clay and loam to sand; but, in general, is sandy and barren, intermixed with fertile spots. The rivers afford abundant irrigation. The indigenous vegetation of the P. is meagre. Trees are few in number and small, and fuel is so scarce that cow-dung is much used in its stead. With an efficient system of agriculture, however, the territories of this

part of India might be rendered very productive. Of the ordinary crops, wheat of excellent quality is produced in considerable quantities, and indigo, sugar, cotton, tobacco, opium, buckwheat, rice, barley, millet, maize, and numerous vegetables and fruits are grown. The manufacturing industry of this region is considerable, and is carried on mostly in the great towns, as Amritsir (q.v.), Lahore (q.v.), Multan (q.v.), etc. Spices and other groceries, dye-stuffs, cloths, metals, and hardware, are imported from the more eastern provinces of Brit. India; and grain, ghee, hides, wool, carpets, shawls, silk, cotton, indigo, tobacco, salt, and horses are exported. The inhabitants are of various races, chiefly Sikhs, Játs, Gujars, Rajputs, and Patans. Of the whole pop., nearly two-thirds are Mohammedans; the remaining third is nearly equally divided between those of the Hindu faith and the Sikhs. There are more than 17,000 Europeans in the P. The Játs are the most prominent race of the P., and are said to have formed the 'core and nucleus' of the Sikh nation and military force. For the history of the P., see SIKHS.

PUNK, n. *pŭngk:* decayed wood; also a production from fungi; pressed into sticks and other forms for tinder; in *OE.*, a prostitute (obs.).

PUNKA, or PUNKAH, n. *pŭng'kă* [Hind. *pankhá*, a fan]: a large fan used for cooling the atmosphere in rooms; consisting of a light frame of wood, from which a short curtain depends; suspended by ropes from the ceiling and pulled to and fro by other ropes.

PUNSHON, WILLIAM MORLEY, LL.D.: 1824, May 29—1881, April 14; b. Doncaster, England; clergyman. He was educated at Wesleyan College, Richmond, England; held pastoral charges in London 1858–68, in Canada 1868–73; returned to England 1873; and was chosen pres. of the British Conference 1874. He had been a preacher since 1840, and attained wide reputation for power and eloquence in the pulpit and on the platform. He published numerous discourses and sermons, and *Life Thoughts* (1863), *Sabbath Chimes* (1867), and *The Prodigal Son* (1868). His *Life* was published by F. W. Macdonald (New York, 1888).

PUNT, v. *pŭnt* [F. *ponte*, a punter at cards: Sp. *punto*, a pip at cards—from L. *punctum*, a point]: to play at basset, faro, or ombre against the banker or dealer. PUNT'ING, imp. PUNT'ED, pp. PUNT'ER, n. *-ėr*, one who punts.

PUNT, n. *pŭnt* [AS. *punt;* Dut. *pont;* F. *ponton*, a ferry-boat: Sp. *ponton*, a bridge—from L. *pons* or *pontem*, a bridge]: heavy, oblong, flat-bottomed boat, useful where stability and not speed is needed. Punts are much used for fishing. Some are fitted for oars; but the more usual mode of propulsion is by poles operating on the bottom—a laborious exercise.

PUNTA ARENAS, *pōn'tä â-rā'nâs*: only seaport of Costa Rica, Central America; on the east side of Nicoya Gulf, an arm of the Pacific: about 60 m. n.w. of San José, of which it is a port of entry and with which it is connected by railroad and carriage-road. It was founded 1840 to take the place of Caldera, given up because of its unhealthfulness. Panama railway and Pacific mail steamers stop here regularly. The climate is not very healthful, and the permanent pop. is small.

PUNY, a. *pū'nĭ* [corrupted from OF. *puisné*: F. *puîné*, younger—from L. *post nātus*, born after (see PUISNE)]: inferior in size or strength; small; feeble; of an under rate. PU'NINESS, n. *-nĭs*, the condition of being puny; littleness; smallness with feebleness.

PUP, n. *pŭp* [L. *pūpus*, a boy; *pūpŭlus*, a small boy: It. *puppa*; F. *poupée*, a doll: Dut. *pop*, a doll]: one of the young of the dog kind; a whelp: V. to bring forth young, applied to the dog kind. PUP'PING, imp. PUPPED, pp. *pŭpt*. PUP'PY, n. *-pĭ*, plu. PUP'PIES, *-pĭz*, a young dog; a conceited, finely dressed young man [from the obsolete sense of a doll]. PUPPYISM, n. *pŭp'pĭ-ĭzm*, extreme affection or conceit. PUP'PYISH, a. *-ĭsh*, like a puppy; conceited.

PUPA, n. *pū'pă*, plu. PUPÆ, *pū'pē* [L. *pūpa*, a doll or puppet]: third or last state but one of insect existence—the first being the *egg*, the second the *Larva* (q.v.), or *caterpillar*, the third the *pupa*, and the fourth or last the perfect insect, or *imāgo*. In those insects of which the metamorphosis is *complete* (see INSECTS), the pupa is generally quite inactive, and takes no food; e.g., in the *Lepidoptera*, the pupa of which is called a *Chrysalis* or *Aurelia*, and in the *Coleoptera*, *Hymenoptera*, and *Diptera*. Manifestations of life may indeed be produced by touching, or in any way irritating, the pupa; but it is incapable of locomotion and of eating. It is quite otherwise with the pupæ of other orders, which are often very voracious, and resemble the perfect insect in almost everything but that the wings are lacking. For peculiarities of the pupa, see titles of the different orders and genera of insects.—*Pupa* is the name also of a genus of small land-snails. PUPE, n. *pūp*, one of the oviform nymphs of lepidopterous insects: one of the nymphæ or chrysalids of metabolian insects.

PUPIL, n. *pū'pĭl* [F. *pupille*, a pupil, the pupil of the eye—from L. *pūpil'lus*, a little boy; *pūpil'la*, a little girl; *pūpus*, a boy: It. *pupilla*, the eyeball; *pupillo*, a ward]: boy, or girl under the care of a teacher or instructor; a scholar: in *law*, a boy or girl before puberty: in the *eye*, the opening in the iris through which the rays of light pass to the retina; the apple of the eye (see EYE). PU'PILAGE, n. *-āj*, the state of being a pupil. PU'PILARITY, n. *-ăr'ĭ-tĭ*, wardship; minority. PU'PILARY, a. *-ĕr-ĭ*, pert. to a pupil or ward.

PUPIPAROUS, a. *pū-pĭp′ă-rŭs* [L. *pūpus*, a child; *parĭō*, I bring forth]: pert. to eggs of insects which are hatched in the matrix of the mother, and not excluded till they become pupes—these insects are called PUPIP′ARA, *-ă-ră*, or PUPIP′ARES, *-ă-rēz*. PUPIVOROUS, a. *pū-pĭv′ŏ-rŭs* [L. *voro*, I devour]: feeding on the *pupæ* or *larvæ* of. insects.

PUPPET, n. *pŭp′pĕt* [L. *pūpus*, a boy or child: It. *puppa*, a child's baby: F. *poupée*, a doll]: a doll; a small image in human form in a show; in *contempt*, one meanly under the control of another. PUPPET-SHOW, theatrical exhibition or play performed by puppets moved by wires. A *puppet* is a childlike image. The Italian *fantoccini* (from *fantino*, a child) and the French *Marionettes* (q.v.) are other names for puppets. P.-plays, or exhibitions in which the parts of the different characters are taken by miniature figures worked by wires, while the dialogue is given by persons behind the scenes, are of very ancient date. Figures with movable limbs have been found in the tombs of ancient Egypt and Etruria. Originally intended to gratify children, they became a diversion for adults. In China and India they are still made to act dramas either as movable figures or as shadows behind a curtain ('Ombres Chinoises'). In Italy and France P.-plays were at one time brought near to artistic perfection, and even Lessing and Goethe in Germany thought the subject worth their serious attention. In England, they are mentioned under the name *Motions* by many early authors, and frequent allusions to them occur in the plays of Shakespeare, Ben Jonson, and the older dramatists. The earliest exhibitions of this kind consisted of representations of stories from the Old and New Test. or from the lives and legends of saints. They thus seem to have been the last remnant of the *Moralities* of the 15th c. We learn from Ben Jonson and his contemporaries that the most popular of these exhibitions at that time were the *Prodigal Son*, and *Nineveh with Jonas and the Whale*. Even the Puritans, with all their hatred of the regular stage, did not object to be present at such representations. In the reign of Queen Elizabeth, P.-plays were exhibited in Fleet Street and Holborn Bridge—localities infested by them at the period of the Restoration. The most noted exhibitions of the kind were those of Robert Powel in the beginning of the 18th c. (See Chambers's *Book of Days*, II. 167.) So recently as the time of Goldsmith, scriptural 'Motions' were common, and, in *She Stoops to Conquer*, reference is made to the display of Solomon's Temple in one of these shows. The regular performances of the stage also were sometimes imitated; and Dr. Samuel Johnson observed, that puppets were so capable of representing even the plays of Shakespeare, that *Macbeth* might be represented by them as well as by living actors. These exhibitions, however, much degenerated, and latterly consisted of a wretched display of wooden figures barbarously formed,

and decorated without the least taste or propriety, while the dialogues were jumbles of absurdities and nonsense.

The mechanism of P.-plays is simple. The exhibitor, concealed above or below the stage, works the figures by means of wires, and delivers the dialogues requisite to pass between the characters. The exhibition of Punch (q.v.) is now almost the only example of this species of acting in this country or Britain.

PUPPY, PUPPYISM, PUPPYISH: see under PUP.

PUR, or PURR, v. *pér* [a word imitative of the sound]: to utter a soft murmuring sound, as a cat when pleased; to signify by purring. PUR'RING, imp.: N. the sound uttered by a cat when pleased. PURRED, pp. *pérd*.

PURÂN'A, *pū-rā'nà* [Skr. *purâna*, old, ancient]: among the *Hindus*, a sacred poetical work explanatory of the Shastras. PURANIC, a. *pū-răn'ik*, pert. to the sacred poems of the Hindus.—*Purân'a* is the name of that class of religious works which, besides the Tantras (q.v.), is the main foundation of the actual popular creed of the Brahminical Hindus (see INDIA, *Hindu Religion*). According to the popular belief, these works were compiled by *Vyâsa* (q.v.), the supposed arranger of the *Vedas* (q.v.), and author of the *Mahâbhârata* (q.v.), and possess an antiquity far beyond historical computation. A critical investigation, however, of the contents of the *existing* works bearing that name must necessarily lead to the conclusion, that in their present form they do not only not belong to a remote age, but can barely claim an antiquity of a thousand years. The word *Purân'a* occurring in passages of the *Mahâbhârata* and in other ancient works, cannot refer to the existing compositions called P. Nevertheless, it must be admitted that there are several circum-tances tending to show that there existed a number of works called P., which preceded the actual works of the same name, and were the source whence probably these derived part of their contents. On one supposition, favored by various indications, there would have been Purân'as about 1900 or 1600 years ago; but none of these have descended to our time in the shape it then possessed. We are however bound to infer that there have been Purân'as older than those preserved to us, and that their number has been 18.

The modern age of this literature in the form in which it is known to us, is evidenced by the change which the religious and philosophical ideas, taught in the epic poems and the philosophical Sûtras, have undergone in it; by the legendary detail into which older legends and myths have expanded; by the numerous religious rites —not countenanced by the Vedic or epic works—which are taught, and, in some Purân'as at least, by the historical or quasi-scientific instruction which is imparted in it. The picture of religion and life unfolded by it is a caricature of that afforded by the Vedic works, and was drawn evidently by priestcraft, interested in subjecting to its sway the popular mind. The present Purân'as

are composed of such a variety of matter that they take on a kind of cyclopedical character. They became, as it seems, the source of all popular knowledge; a substitute to the masses of the nation, not only for the earlier theological literature, but for scientific works whose study was gradually restricted to the leisure of the learned few. Thus, while the principal subjects taught by nearly all the P. are cosmogony, the destruction and renovation of worlds, religion, including law, genealogy of gods and patriarchs, and the legendary matter—such as the history of the princes of the solar and lunar races, which, to a Hindu, assumes the value of history—in some of them are descriptions of places, which gives to them something of the character of geography; while one, the *Agni-P.*, pretends to teach also archery, medicine, rhetoric, prosody, and grammar; though the teaching has no real worth.

'One purpose, however, and that a paramount one, in the composition of the Purâṅ'as is the purpose of establishing a sectarian creed. At the third phase of Hindu Religion (q.v.), two gods of the Hindu pantheon especially engrossed the religion faith of the masses, Vishṅ'u (q.v.), and S'iva (q.v.), each regarded by his worshippers as the supreme deity, to whom the other as well as the remaining gods were subordinate. Moreover, when the *power* or energy of these gods had been raised to the rank of a separate deity, it was the female S'akti, or energy, of S'iva, who, as Durgâ or the consort of this god, was held in peculiar awe by a host of believers. Probably the principal purpose of the Purâṅ'as, was to establish, as the case might be, the supremacy of Vishṅ'u or S'iva—and it may be likewise assumed of the female energy of S'iva, though the worship of the latter belongs more exclusively to the class of works known as Tantras. There are accordingly, Vaishṅ'ava-Purâṅ'as, or those composed for the glory of Vishṅ'u, and S'aiva P., or those which extol the worship of S'iva.

'The invariable form of the Purâṅ'as,' says Prof. Wilson, in *Preface to the Vishṅ'u-Purâṅ'a*, 'is that of a dialogue in which some person relates its contents in reply to the inquiries of another. This dialogue is interwoven with others, which are repeated as having been held, on other occasions, between different individuals, in consequence of similar questions having been asked.

The number of the actual Purâṅ'as is stated to be 18, and their names, in the order given, are the following: 1. *Brahma-*; 2. *Padma-*; 3. *Vishṅ'u-*; 4. *S'iva-*; 5. *Bhâgavata-*; 6. *Nâradiya-*; 7. *Mârkaṅ'd'eya-*; 8. *Agni-*; 9. *Bhavishya-*; 10. *Brahmavaivartta-*; 11. *Linga-*; 12. *Varâha-*; 13. *Skanda-*; 14. *Vâmana-*; 15. *Kûrma-*; 16. *Matsya-*; 17. *Garuḍ'a-*; and 18. *Brahmâṅ'da-Purâṅ'a*. In other lists, the *Agni-P.* is omitted, and the *Vâyu-P.* inserted instead of it; or the *Garuḍ'a* and *Brahmâṅ'da* are omitted, and replaced by the *Vâyu* and *Nr'isinha Purâṅ'as*. The age of the P., though doubtless modern, is uncertain. The *Bhâgavata*, on account of its being ascribed to the authorship of the

grammarian Vopadeva, appears to yield a safer computation of its age than the rest; for Vopadeva lived in the 12th c., or, as some hold, 13th c. after Christ; but this authorship, though probable, is not proved. As to the other Purân'as, their age is supposed by Prof. Wilson to fall within the 12th and 17th centuries of the Christian era, except the *Mârkan'd'eya-P.*, which in consideration of its unsectarian character he places in the 9th or 10 c. But all these dates are given as purely conjectural. Besides the 18 Purân'as or great Purân'as, there are minor or *Upapurân'as*, 'differing little in extent or subject from some of those to which the title of Purân'a is ascribed.'

Both Purân'as and Upapurân'as are for a considerable portion of their contents largely indebted to the two great epic works, the *Mahâbhârata* (q.v.) and *Râmâyan'a* (q.v.), especially to the former. Of the Purân'as, the original text of three has already appeared in print: that of the *Bâgavata* in several native editions, published at Bombay, with the commentary of S'rîdharaswâmin, partly in a Paris edition by Eugène Burnouf, which remained incomplete through the premature death of that distinguished scholar; that of the *Mârkan'd'eya-P.*, edited at Calcutta in *Bibliotheca Indica*, by the Rev. K. M. Banerjea; and that of the *Linga-P.*, edited at Bombay. Of translations, we have only to name the excellent French translation by Burnouf of the first nine books of the *Bhâgavata*, and the elegant translation of the whole *Vishn'u-P.*, together with valuable notes by the late Prof. H. H. Wilson, recently republished in his works, in a new ed. amplified with numerous notes, by Prof. F. E. Hall.—For general information on the character and contents of the Purân'as, see especially Wilson's preface to his translation of the *Vishn'u-P.* (Works, VI. Lond. 1864), Burnouf's preface to his ed. of the *Bhâgavata* (Paris 1840), Wilson's *Analysis of the Purân'as* (Works III. Lond. 1864, edited by Prof. R. Rost), K. M. Banerjea's *Introduction to the Mârkan'd'eya* (Calcutta 1862), and John Muir's *Original Sanscrit Texts on the Origin and History of the People of India*, I.–V. (Lond, 1858–71).

PURBECK, *pêr'bĕk*, Isle of: district in Dorsetshire, England, 14 m. in length from w. to e. and 7 m. in breadth; bounded n. by the river Frome and Poole Harbor, e. and s. by the English Channel, w. by the stream of Luckford Lake, which, rising in the park of Lulworth Castle, flows n. and joins the Frome. On the w. the water-boundary is not complete, the district being connected with the main portion of the county at E. Lulworth; and the Isle of P. is therefore really a peninsula. In ancient times the Isle of P. was a royal deer-forest. See Purbeck Beds: Purbeck Marble.

PURBECK BEDS: group of strata forming the upper members of the Oolite Group (q.v.), so named because they are, well developed in the Isle of Purbeck (q.v.). They are, like the Wealden beds above them, chiefly fresh-water formations; but their organic remains join them more closely to the marine-formed Oolites below than to the superior Wealden series. Though of very limited geographical extent, the Purbeck beds have considerable importance, from the changes in animal life that took place during their deposition. Though generally less than 200 ft. in thickness, they exhibit three distinct and peculiar sets of animal remains: this has caused them to be arranged into three corresponding groups, the Upper, Middle, and Lower Purbecks.

The Upper Purbecks are entirely fresh-water, and the strata are largely charged with remains of shells and fish; the cases of the Entomostraca Cyprides are very abundant and characteristic. The building-stone called Purbeck Marble belongs to this division.

The Middle Purbecks record numerous changes during their deposition. The newest of the strata consists of fresh-water limestone, with remains of Cyprides, turtles, and fish. This rests on brackish water-beds—Cyrena with layers of Corbula and Melania. Below this are marine strata containing many species of sea-shells. Then follow some fresh and brackish-water limestone and shales, which rest on the cinder-bed, a marine argillaceous deposit containing a vast accumulation of the shells of a small oyster. This is preceded by fresh-water strata, abounding in the remains of Entomostraca, and containing some beds of cherty limestone, in which little bodies, believed to have been the spore-cases of species of Chara, have been found. At the base of this sub-group, a marine shale occurs, containing shells and impressions apparently of a large Zostera.

The Lower Purbecks begin with a series of fresh-water marls, containing Entomostraca and shells. These rest on strata of brackish-water origin; and then follows a singular old vegetable soil, containing the roots and stools of Cycads, and the stems of coniferous trees. From its black color and incoherent condition, this layer has received from the quarrymen the name 'Dirt-bed' (q.v.). This rests on the basement bed of the whole group, which is a fresh-water limestone, charged with Entomostraca and shells, and contains the thin layer in which have been found remains of several species of mammalia.

PUR'BECK MAR'BLE, or PURBECK STONE: impure fresh-water limestone, containing immense numbers of the shells of Paludina, from which it derives its 'figure' when polished. It was formerly much used in interior decoration of churches and other buildings in the s. counties of England. It is quarried in the Isle of Purbeck (q.v.), and belongs to the upper section of the Purbeck Beds (q.v.).

PURBLIND, a. *pėr blīnd* [Dut. *puur*, simple, only, and Eng. *blind*—a corruption of Eng. *pure blind*, that is, wholly blind, the original meaning of the word]: near-sighted; seeing obscurely. PURBLIND'LY, ad. *-li*. PURBLIND'NESS, n. *-nės*, the quality or state of being purblind; shortness of sight; dimness of vision.

PURCELL, *pėr'sėl*, HENRY; most eminent of English musicians: 1658–1695, Nov. 21; b. Westminster; son of Henry P., one of the gentlemen of the Chapel-royal appointed at the Restoration. He lost his father at the age of six, and was indebted for his musical training to Cook, Humphreys, and Dr. Blow. His compositions very early showed talent. In 1676, he was chosen to succeed Dr. Christopher Gibbons as organist of Westminster Abbey; and 1682 he was made organist of the Chapel-royal. He wrote numerous anthems and other compositions for the church, which were eagerly sought after for various cathedrals, and have retained their place to the present day. P.'s dramatic and chamber compositions are still more remarkable. Among the former are his music to the *Tempest*, his songs in Dryden's *King Arthur*, his music to Howard's and Dryden's *Indian Queen*, to Urfey's *Don Quixote*, etc. A great many of his cantatas, odes, glees, catches, and rounds are yet familiar to lovers of vocal music. In 1683, he composed 12 sonatas for two violins and a bass. P. studied the Italian masters deeply, and often made reference to his obligations to them. In originality and vigor, as well as harmony and variety of expression, he far surpassed his predecessors and his contemporaries. His greatest work is his Te Deum and Jubilate written for St. Cecilia's Day 1694—the earliest English Te Deum with orchestral accompaniments. His church music was collected and edited from the original MS. by Vincent Novello, in a folio 1826–36, with portrait and essay on his life and works. He died of consumption and was buried in Westminster Abbey.

PURCHAS, *pėr'chas*, SAMUEL: 1577–1626; b. Thaxted, Essex co., England: author. In 1600 he graduated M.A. at St. John's College, Cambridge, from which he afterward received the degree B.D. In 1604 he was presented by James I. to the vicarage of Eastwood, Essex; and 1615 received the rectory of St. Martin's, Ludgate, London, and became chaplain to Abbot, Abp. of Canterbury. In 1613,15, and 25 he published compilations from a large number of writers entitled, *Purchas, his Pilgrimage, or Relations of the World, and the Religions observed in all Ages; Purchas, his Pilgrim or Microcosmus, or the Historie of Man*, etc., *Purchas, his Pilgrimes, or Relation of the World in Sea Voyages and Lande Travels by Englishmen and others*. He was author of *King's Tower and Triumphal Arch of London*, a sermon pub. 1623. He died at London.

PURCHASE, n. *pėr'chās* [F. *pourchasser*, eagerly to pursue—*pour*, in the sense of L. *per*, through, thoroughly; F. *chasser*, to hunt: It. *procacciare*, to endeavor to get]: anything acquired by paying a price in money; anything obtained by labor or danger, etc.; any mechanical hold, power, or advantage applied to the raising or removing of heavy bodies: V. to buy; to obtain in exchange for money; to obtain at the expense of labor, skill, etc.; to gain advantage or power by mechanical means. PUR'CHASING, imp. PUR'CHASED, pp. *-chāst*. PUR'CHASER, n. *-ėr*, one who purchases (see SALE). PUR'CHASABLE, a. *-chās-ă-bl*, that may be obtained or bought for money or other consideration. PURCHASE-MONEY, the amount or sum of money paid for property, or anything bought.

PUR'CHASE-SYSTEM: highly unpopular and much misunderstood arrangement of former times in the British army, by which a large proportion—more than half—of the first appointments of officers and their subsequent promotion were effected. It dates from the first formation of an English standing army, and was formally recognized in the reign of Queen Anne. The system itself was very simple. A price was fixed by regulation for each substantive rank (see PROMOTION), viz.—

	Price	Difference.
Lieutenant-colonel, . . .	£4500	£1300
Major, ...	3200	1400
Captain, ...	1800	1100
Lieutenant, ...	700	250
Cornet or Ensign, ...	450	

When any officer holding one of these regimental commissions desired to retire from the army, he was entitled to sell his commission for the price stipulated in the above table—£4,500, in the case of a lieut.col. This sum was made up by the senior major, who was willing and able to purchase, buying the rank of lieut.col. for £1,300; by the senior cap., willing and able to purchase, buying a majority for £1,400; by a lieut. purchasing his company for £1,100; by a cornet or ensign becoming lieut. on payment of £250; and lastly by the sale to some young gentleman of an ensigncy or cornetcy for £450.

No commission could be purchased by one officer unless another officer vacated his commission by its sale. Death-vacancies, vacancies caused by augmenting a regt., vacancies resulting from the promotion of colonels to be major-generals, were filled without purchase, usually by seniority. No rank above lieut.col. could be purchased.

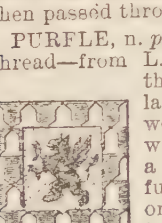
The disadvantages of such a system are evident; but it is argued with some probability that they were not unmixed. The purchase-system was abolished by royal warrant 1871, July; and in the same year, parliament laid down a scheme for the gradual compensation of officers who had lost their selling rights.

PURDUE UNIVERSITY: co-educational institution at Lafayette, Ind.; founded as the Indiana Institute of Technology by aid of the national land grant; name changed to its present one 1869 in honor of John Purdue, who gave it $150,000, opened 1874. It has schools of mechanical, civil, and electrical engineering, of science, agriculture, and pharmacy; also a preparatory school. Tuition is free. It has endowments and annuities of $1,800,000; 120 acres of land; and buildings valued at over $500,000. In 1894 it had 50 instructors, 700 students, and about 6,000 vols. in its libraries. James H. Smart, LL.D., was president.

PURE, a. *pūr* [F. *pur*, pure—from L. *pūrus*, clean, undefiled; It. *puro;* Skr. *pu*, to purify]: free from everything that can debase or render unclean: unpolluted; clear; not dirty; genuine; not adulterated; holy; guiltless; chaste; not foul; mere; absolute. PURE'LY, ad. *-li*, merely; completely; in a pure manner. PURE'NESS, n. *-nĕs*, or PURITY, n. *pūr'i-ti*, freedom from foulness or dirt; freedom from guilt; freedom from anything improper in thought, motive, or language; innocence; chastity. PURE MATHEMATICS, mathematics which treat of the principles of the science alone, and deal in abstract quantity only; opposed to *mixed* or *applied* mathematics. PURE STYLE, the quality of writings that are without any mixture of foreign or corrupt words. PURE AND SIMPLE [F. *pur*, pure, entire; *simple*, plain, simple]: truly and honestly; without any qualification whatever; unconditionally.—SYN. of 'pure': clear; clean; holy; unmingled; unmixed; unaltered; unsullied; guileless; disinterested; fair; genuine; real; unadulterated; free; guiltless; innocent; incorrupt; unvitiated; mere; chaste; modest; unpolluted; simple; true; uncorrupted; untarnished; untainted; stainless; unspotted; spotless; undefiled; immaculate.

PURÉE, n. *pō-rā'* [F., pea-soup: according to Brachet, from mid. L. *pipērāta*, properly, peppered meat—from L. *piper*, pepper]: any vegetable or meat simmered down till the substance becomes soft or pulpy, which is then passed through a horse-hair or tammy sieve.

PURFLE, n. *pĕr'fl* [OF. *pourfiler*, to overcast with gold thread—from L. *per*, through, thoroughly; *fīlum*, a thread; comp. Scot. *pearling*, a kind of lace made of thread or silk]: ornamental work about the edge of a garment—now written in the contracted form of PURL, a kind of edging for lace: in *her.*, ermine, furs, etc., composing a border: V. to decorate with a wrought or flowered border; to embroider. PURFLING, imp. *pĕr'fling:* ADJ. showing a border. PURFLED, pp. *pĕr'fld:* ADJ. bordered as with embroidery. PUR'FLED, or PURFLEWED, in *her.*, term referring to the lining, bordering, or garnishing of robes, or ornamentation of armor.



Purfle.

PURGATION, PURGATIVE—see under PURGE.

PUR'GATIVES: medicines which, within a definite and comparatively short time after exhibition, produce the evacuation of the bowels. The remedies included under this head have various modifications of action, which adapt them for different therapeutic applications. They are divided by Pereira into five groups, viz.:

1. *Laxatives*—A purgative is said to be laxative when it operates so mildly as merely to evacuate the intestines without occasioning any general excitement of the system, or any extraordinary increase of watery secretion from the capillaries of the alimentary canal. This group includes manna, sulphur, cassia pulp, castor oil, etc.; and purgatives of this kind are used when the bowels are to be evacuated with the least possible irritation, as in children and pregnant women; in cases of hernia, piles, stricture or prolapsus of the rectum, etc.

2. *Saline* or *Cooling Purgatives;* e.g., sulphate of magnesia, and potassio-tartrate of soda, either in simple solution, or in the form of Seidlitz Powder (q.v.). Various natural mineral waters are in this class (see MINERAL WATERS). They give rise to more watery evacuations than the members of the preceding group, and are much used in inflammatory and febrile cases.

3. *Milder Acrid Purgatives;* e.g., senna, rhubarb, and aloes. They possess acrid and stimulating properties, and are intermediate in activity between the 2d and the 4th group. Senna (usually in the form of Black Draught) is used when there is required an active but not very irritant purgative. Rhubarb is adapted for patients especially in whom there is lack of tone in the alimentary canal. Aloes is used in torpid conditions of the large intestine; but as this drug irritates the rectum, it should be avoided in cases of piles, and in pregnancy, especially if there is any threatening of miscarriage.

4. *Drastic Purgatives;* e.g., jalap, scammony, gamboge, croton oil, colocynth, and elaterium. These, when swallowed in large doses, act as irritant poisons, and are employed in medicine when the bowels have resisted the action of milder purgatives, or when it is requisite to exert a powerful derivative action on the intestinal mucous membrane (as in cases of apoplexy, when croton oil is commonly used); or when it is necessary to remove a large quantity of water from the system, as in dropsical affections, in which case, elaterium, from its hydragogue power, is usually employed.

5. *Mercurial Purgatives;* the chief of which are calomel, blue pill, and gray powder. They have been given to increase the discharge of bile, though their power in this respect has recently been denied. As their action is uncertain, they are usually combined with or followed by other purgatives. They are far less used than formerly. Podophyllin (q.v.), has recently been much used for exciting bilious evacuations. Hamilton's book *On Purgative Medicines*, though published more than half a century ago, is still one of the standard works on purgatives, especially of those long in use.

PURGATORY, n. *pĕr'gă-tĕr-ĭ* [F. *purgatoire*— from L. *purgatōrius*, cleansing (see PURGE)]: in *Rom. Cath. theol.* the state after death in which souls are purged from impurities of earth before they are received into heaven: ADJ. cleansing. PUR'GATO'RIAL, a. *-tō'rĭ-ăl*, pert. to Purgatory.—*Purgatory*, in the creeds of the Rom. Cath. and of the oriental churches, is a place of purgation, in which souls after death either are purified from venial sins (*peccata venalia*), or undergo the temporal punishment which, after the guilt of mortal sin (*peccata mortalia*) has been remitted, still remains to be endured by the sinner. The ultimate eternal happiness of such souls is supposed to be secured; but they are detained for a time in a state of purgation, in order to be fitted to appear in that Presence into which nothing imperfect can enter. As there is some obscurity and much misunderstanding on this subject, we shall briefly explain the Rom. Cath. doctrine as collected from authentic sources, distinguishing those things which are held by them as 'of faith,' from the mere opinions which are freely discussed in their schools. Rom. Catholics hold as articles of their faith (1) that there is a P. in the sense explained above, (2) that the souls there detained derive relief from the prayers of the faithful and from the sacrifice of the mass. The Scriptural grounds alleged by them in support of this view are II Macc. xii. 43–46 (on which they rely, not merely on the supposition of its being inspired, but even as a simple historical testimony); Matt. xii. 32; I Cor. iii. 11–15; xv. 29; as well as certain less decisive indications in the language of some of the Psalms—e.g., xxxvii. (in Auth. Vers. xxxviii.), 1; and lxv. 12. And in all these passages they argue not alone from the words themselves, but from the interpretation of them by the Fathers, as containing the doctrine of a P. The direct testimonies cited by Rom. Cath. writers from the Fathers to the belief of their respective ages as to the existence of a P. are very numerous. Among the Greeks may be instanced: Clement of Alexandria, *Stromata*, vii. 12; Origen, *Hom.* xvi. c. 5, 6 *in Jeremiam;* vi. *Hom. in Exod.;* xiv. *Hom. in Levit.;* xxviii. *Hom. in Numb.;* Eusebius, *De Vita Constantini*, iv. 71; Athanasius, *Quæst.* xxxiv. *ad Antioch.;* Cyril of Jerusalem, *Cat. Mystag.* v. 9; Basil, *Hom. in Psalm.* v. 7; Gregory of Nazianzum, xli. *Orat. de Laude Athanasii;* Gregory of Nyssa, *Orat. de Bapt.;* also Epiphanius, Ephrem, Theodoret, and others. Among the Latins: Tertullian, Cyprian, Arnobius, Lactantius, Hilary, Ambrose, and above all, Augustine, from whom many most decisive passages are cited; Paulinus of Nola; and Gregory the Great, in whom the doctrine is found in all the fullness of its modern detail. The epitaphs of the catacombs, too, supply Rom. Cath. controversialists with some testimonies to the belief of a P. and of the value of the intercessory prayers of the living in obtaining not merely repose, but relief from suffering, for the deceased; and the liturgies of the various rites are still more decisive and circumstantial.

Beyond these two points, Rom. Cath. faith, as defined by the Council of Trent, does not go; and the council expressly prohibits the popular discussion of the 'more difficult and subtle questions, and everything that tends to curiosity, or superstition, or savors of filthy lucre.' Of the further questions as to the nature of P. there is one of great historical importance, inasmuch as it constitutes one of the grounds of difference between the Greek and Latin churches. As to the existence of P., both these churches are agreed; and they are further agreed that it is a place of suffering; but, while the Latins commonly hold that this suffering is 'by fire,' the Greeks do not determine the manner of the suffering, but are content to regard it as 'through tribulation.' The decree of union in the Council of Florence (1439) left this point free for discussion. Equally free are the questions as to the situation of P.; as to the duration of the purgatorial suffering; as to the probable number of its inmates; as to whether they have, while there detained, *a certainty* of their ultimate salvation; and whether a 'particular judgment' takes place on each individual case immediately after death.—See Bellarminus, *De Purgatorio;* Suarezius, *De Purgatorio;* and on the Greek portion of the subject, Leo Allatius, *De utriusque Ecclesiæ in Dogmate de Purgatorio perpetuâ Consensione.*

The mediæval doctrine and practice regarding P. were among the leading grounds of the protest of the Waldenses and other sects of that age. The Reformers as a body rejected the doctrine.

What is called the 'historical' or critical view of its genesis is well given by Neander (*Dogmengeschichte* I). He conceives that its source is to be sought in the ancient Persian doctrine of a purifying conflagration which was to precede the final victory of Ormuzd, and consume everything impure. From the Persians it passed with modifications to the Jews, and from them found its way into the ethical speculations of the more cultivated Christians. It harmonized admirably with the widespread philosophical notion borrowed by the Gnostic Christians from Neo-Platonism, that matter is inherently evil. If then the *body* was to rise, it must be purged of its evil, and the instrument of purification—fire—was at hand for the purpose. Moreover, the high and pure conception of the character of God revealed in the New Test. necessitating a corresponding moral excellence on the part of his worshippers—'without holiness shall no man see the Lord'—must have greatly assisted in the establishment of the doctrine, for how could men, only lately gross heathens, possessing yet but the rudiments of the new faith, and with most of their heathen habits still clinging about them, be pronounced 'holy' or 'fit for the presence of God'? Their 'faith' in Christ was sufficient to save them; but the work of sanctification was incomplete when they died, and must go on thereafter. Probably it was a strong

Christian feeling of this sort that determined the reception of the doctrine of P. into the creed of the Rom. Cath. Church, rather than any Gnostic philosophizings, though the Neo-Platonic divines of Alexandria are the first to mention it.

Protestants generally reply to the arguments of Rom. Catholics on this subject, by refusing to admit the authority of tradition or the testimonies of the Fathers, and at the same time by alleging that most—if not all—of the passages quoted from the Fathers, as in favor of P., are insufficient to prove that they held any such doctrine as that now held by the Rom. Cath. Church, some of them properly relating only to the subject of prayer for the dead, and others to the doctrine of Limbus (q.v.). That the doctrine of P. is a logical development of that which maintains that prayer ought to be made for the dead, Protestants generally acknowledge; but refuse to admit that the Fathers carried out their views to any such consequence. As to the alleged evidences from Scripture, they are commonly set aside by Protestants as utterly inapplicable. The vaunted argument from II Maccabees is of course contemned, as being from an apocryphal book, and not one of the best books of the Apocrypha; besides that, the passage relates to nothing more than prayer for the dead. The text Matt. xii. 32, is explained as relating to the final judgment; and I Cor. iii. 11–15, as relating to a trial of *works*, and not of persons; while I Cor. xv. 29, is regarded as having nothing more to do with the subject than any verse taken at random from any part of the Bible.

PURGE, v. *pėrj* [F. *purger*, to purge; *purge*, cleansing —from L. *purgārĕ*, to purify—from *pūrus*, pure: It. *purgare*]: to cleanse or clear from impurities; to purify; to clear from guilt or moral defilement; to grow or become pure; to have frequent loose evacuations from the intestines; to clear from accusation on a charge of crime: N. a medicine that causes frequent evacuations of the intestines. PURG'ING, imp.: N. great looseness of the bowels; diarrhea. PURGED, pp. *pėrjd*. PURGATION, n. *pėr-gā'shŭn* [F.—L.]: the act of purifying; the act of clearing from imputation of guilt (see ORDEAL). PURGATIVE, a. *pėr'gă-tiv* [F. *purgatif*—L. *purgatīvus*]: cleansing; having the power of evacuating the bowels: N. a medicine that causes the bowels to evacuate freely; a cathartic (see PURGATIVES). PURGING NUT (see PHYSIC NUT). PRIDE'S PURGE, in *Eng. hist.*, the expulsion by Colonel Pride, December 6, 1648, from the house of commons, of those members who voted for peace and the acceptance of the terms proffered by King Charles I. —SYN. of 'purge, v.': to clear; purify; cleanse; sweep away; evacuate; clarify; defecate; remove; deterge; wash away.

PURIFICA'TION, in the Old Testament Use: act through which an individual became fit to approach the Deity, or to mix freely in the community, in cases where a certain bodily or other disability had kept him segregated. The P. consisted chiefly in expiations, ablutions, sometimes accompanied by special sacrifices. Priests and Levites were consecrated for the Divine service by P.; proselytes had to undergo it at baptism; and special religious acts could be performed only by those who had 'bathed their bodies.' Generally, no one was allowed to enter the Temple or synagogue without having washed or 'sanctified' himself; and in the post-exilian period, bathing was considered (chiefly by the Pharisees and Essenes) as one of the chief duties of piety. In general, the Mosaic Law distinguishes between 'clean' and 'unclean' persons as well as things, calling 'unclean' all that with which an Israelite is not to come in contact. It has been erroneously assumed that all the Levitical laws of purity and P. have a physical or medical reason—that is, that infection was to be prevented through them; but this can have been the case only in some instances. However, we cannot deny that we are at a loss for the general principle on which they were based. There can be no doubt that cleanness, like every other virtue, if not enforced on religious grounds, would have had few devotees in those days and among an eastern people; while, again, a hot climate requires much greater attention to outward purity than more temperate zones. Compared with the Indian and Persian laws in this respect, the Jewish laws seem much less minute and harassing. For the P. from the severer kinds of uncleanness, a certain 'water of uncleanness' (Lev. xv.) was prepared; and the different acts to be performed for the readmission of the leper into the community (Lev. xiv. 4–32), show plainly that his was considered the last stage of impurity. Identical with the first stage of the leper's P. are the ceremonies to be performed in the case of infected houses and garments. The sixth Seder of the Mishnah, in 11 treatises (there is no Gemara to this portion, except to Niddah), contains the most detailed regulations (as fixed by tradition) on this point. The washing of hands was in later times considered ritually necessary, in accordance with the Talmudical maxim, that 'every table should properly be sanctified into an altar.' See UNCLEANNESS.

All the Jewish ceremonial purifications are commonly regarded by Christian theologians as emblematic of the necessity of holiness in the people of the Lord, particularly in all acts of worship.

PURIFICATION OF THE BLESSED VIRGIN MARY, FEAST OF: festival in commemoration of the 'purification' of the Blessed Virgin Mary, in accordance with the ceremonial law of Lev. xii. 2. This ceremony was appointed for the 40th day after childbirth, which, reckoning from Dec. 25 (the Nativity of our Lord), falls on Feb. 2, on which day the purification is celebrated.

The history of Mary's compliance with the law is related Luke ii. 22–24; and as on the same occasion she complied also with the law of Numb. xviii. 15, by the offering prescribed in redemption of the first-born, the festival is called also by the name of the 'Presentation of the Child Jesus,' or the 'Feast of Simeon,' and sometimes, also, 'of the Meeting' (*occursus*), in allusion to Simeon's meeting the Virgin mother, and taking the child into his arms (Luke ii. 25). The date of the introduction of this festival is uncertain.

PURIFORM, a. *pū'ri-fawrm* [L. *pus*, the viscous matter of a sore, *pūris*, of matter; *forma*, shape]: in *med.*, consisting of or resembling pus.

PURIFY, v. *pū'ri-fī* [F. *purifier*—from L. *purificārĕ*, to make clean—from *pūrus*, clean; *facĭō*, I make: It. *purificare* (see PURE)]: to make pure; to free from guilt or uncleanness; to clear from any extraneous mixture; to free from ceremonial pollution; to grow or become clear or pure. PU'RIFYING, imp.: ADJ. making clear or pure; refining; cleansing: N. the act or operation of cleansing. PU'RIFIED, pp. *-fīd*: ADJ. made pure. PU'RIFIER, n. *-fī-ĕr*, one who or that which purifies. PURIFICA'TION, n. *-kā'shŭn* [F.—L.]: the act or operation of making clean; the act of cleansing from extraneous mixture; the cleansing from sin; in the *Old Test.*, the operation of removing ceremonial defilement or pollution (see above). PURIFICATIVE, a. *pū'ri-fī-kā-tĭv*, or PURIFICATORY, a. *-rĭf'ĭ-kā-tŏr-ĭ*, able or tending to purify or cleanse. PURIFICATOR, n. *pū'ri-fī-kā'tŏr*, a purifier; a napkin used for wiping the chalice.

PURIM, n. *pū'rĭm* [Heb. *pur*, a lot; plu. *purim*]: among *the Jews*, the feast of lots, an annual festival of two days on the 14th and 15th of the month Adar (Adar begins about Feb. 14). The 'fast of Esther' is on the day preceding P. The 3 days commemorate the deliverance of the Jews from the massacre planned by Haman (see Esther ix. 24–26; also iii. 7). At starlight of Adar 14th there is a religious service in the synagogues, and on the morning of the same day another service: the remainder of the 14th and the whole of the 15th are devoted to merriment and to such observances as are usual among Christians at Christmas and New Year.

PURINTON, DANIEL BOARDMAN, LL.D.: 1850, Feb. 15 ——————: educator; b. Preston co., Va. He graduated at the State Univ. of W. Va. 1873; was vice-pres. and a prof. there for several years; and 1889 was elected pres. of Denison Univ., Granville, O. He published *Christian Theism* (1889); also numerous hymns and poems.

PURIST, n. *pūr'ĭst* [L. *pūrus*, clean, unstained (see PURE)]: one excessively nice in the choice of words; one who holds that the New Test. was written in pure Greek; one who affects great purity of conduct. PUR'ISM, n. *-rĭzm*, the practice or affectation of rigid purity in the use of words; the affectation of great purity of conduct.

PURITAN, n. *pūr'ĭ-tăn* [from Eng. *pure*, which see]: one who sincerely strives for, or one who pertinaciously affects, rigid purity in religious matters; a name given, presumably in derision, to Prot. dissenters or nonconformists in the reign of Elizabeth and of her two successors (see PURITANS): ADJ. pert. to the Puritans or more strict reformers in doctrine or practice in the reformation of the Church of England. PUR'ITANISM, n. *-ĭzm*, doctrines and practices of the Puritans. PUR'ITAN'IC, a. *-tăn'ĭk*, or PUR'ITAN'ICAL, a. *-ĭ-kăl*, rigid in religious matters, usually as a term of reproach. PUR'ITAN'ICALLY, ad. *-lĭ*.

PUR'ITANS: name given first, according to Fuller, 1564, and according to Strype, 1569, to those clergymen of the Church of England who refused to conform to its liturgy, ceremonies, and discipline as arranged by Abp. Parker and his Episcopal coadjutors. But, in fact, the Puritan tendency in the Church of England is as old as the church itself; and for its true origin we must go back to the period of Cranmer, who, when laying the foundations of English Protestantism in a nation only half-prepared for the change, found it necessary to make concessions to the older form of religion, and to build the new church on an elaborate system of compromise. This feature of 'Anglicanism'—its essential *broad-churchism*, which at the present day strongly commends it to many minds—gave great offense to the stricter and more doctrinal of the English reformers, who either conscientiously denied the propriety of deciding or lacked competence to decide, concerning the interests of the church from a statesman's point of view. The reign of Edward VI., brief though it was, showed quite clearly that if the party in the English Church who had acquired not only their theology, but their opinions of church-government from Calvin, ever got the upper hand, they would not stop till they had reconstructed, on a much simpler basis, the whole ecclesiastical fabric. The reaction under Mary drove most of them to seek safety in exile on the continent; and there the first definite step in the history of Puritanism was taken. A number of the exiles resident at Frankfurt determined to adopt the Genevan service-book in preference to that appointed by King Edward, and though their attempt proved a failure, partly on account of the opposition of others of the exiles, yet it showed the pertinacity with which they tried to carry their convictions into practice. On their return to England, after the accession of Elizabeth, the struggle was renewed. But the virile queen would not tolerate their notions, and during her whole reign, punished in the most stringent style all who refused to obey the Episcopal ordinances. The position assumed by the P. was that the liturgy, ceremonies, and discipline of the Church of England required further reformation; that the church, as then constituted, did not separate itself distinctly enough from Rom. Catholicism; and that

it was desirable, in the interests of spiritual religion, to abandon everything that could show no other authority than tradition or the will of man, and to follow as far as possible the 'pure' word of God. Hence their name, given probably in derision. In spite of the sharpest repressive measures, their principles gradually spread among the serious portion of the laity, who also were called P. But the name appears not to have been confined to those who wished for certain radical changes in the forms of the church. The character that generally accompanied this wish led naturally enough to a wider use of the term; hence, according to Sylvester, 'the vicious multitude of the ungodly called all Puritans that were strict and serious in a holy life, were they ever so conformable.' This is the sense in which the Elizabethan dramatists used the word. From this very breadth of usage, it is evident that there were different degrees of Puritanism. Some would have been content with a moderate reform in the rites, discipline, and liturgy of the church; others (like Cartwright of Cambridge) wished to abolish Episcopacy altogether, and to substitute Presbyterianism: while a third party, the Independents (see CONGREGATIONALISM), were thorough dissenters, opposed equally to Presbyterianism and to Episcopacy. During the reigns of James I. and Charles I., the spirit of Puritanism continued more and more to leaven English society and the English parliament, though most violent efforts were made by both monarchs to extirpate it. The tyrannical proceedings of Laud and of the Laudian bishops, and the outrages practised by Charles on the English constitution, led many who were not at all Genevan in their ideas to oppose both church and king for the sake of the national liberties. Hume distinguishes three kinds of P.: 1. The *Political P.*, who disliked the bishops, not so much on ecclesiastical grounds as on account of their servility toward the king and their priestly antipathy to civil liberty; 2. The *P. in Church Discipline*, who were mostly—at least in the earlier struggle—in favor of Presbyterianism; 3. The *Doctrinal P.*, who were strong Calvinists on such points as predestination, free-will, grace, etc., but were not opposed to Episcopacy or to the ecclesiastical authority of the monarch, and who contented themselves with assailing the Arminianism that was encouraged at court. The attitude of this third class was certainly anomalous, and it is not wonderful that they exercised so little influence or control on the march of events in the great civil struggle. The second class was by far the most numerous—at least among the clergy; and at first it seemed that the Presb. clergy were going to have things all their own way. For example, in the memorable 'Westminster Assembly of Divines' (1643), the great majority of the ministers were Presbyterians, and their *Confession of Faith* is quite Presbyterian in spirit. But genius, energy—the arms of victory—belonged to the more advanced P., who increasingly in England came to stand on Congregationa-

principles, and who became predominant in the army and the parliament, and ultimately triumphed in the person of Cromwell (q.v.). But the Restoration (1660) brought back Episcopacy, and the Act of Uniformity (1662) threw the P. of the church into the position of dissenters. For their subsequent history, see the titles of the various forms of dissent. Before the civil war broke out, so great were the hardships to which the P. were exposed, that many of them took refuge first in Holland or elsewhere on the continent, and then emigrated seeking liberty and peace on the solitary shores of the new world. There they became the founders of the New England states, and cultivated unmolested that form of Christianity to which they were attached. Nowhere did the spirit of Puritanism in its evil as well as its good more thoroughly express itself than in the Bay colony in Massachusetts. Its evil was in part the general evil of the stormy and brutal times, and in part an unbalanced reaction from the prevalent evils of the whole ecclesiastical and civil state: its good is now widely recognized as having served as the solid foundation of much of the modern fabric of civil and religious liberty. For proper understanding of the historic Puritan epoch it is indispensable to distinguish between two distinct classes of P.: see PILGRIM FATHERS: CROMWELL, OLIVER: CONGREGATIONALISM. In Scotland, Puritanism, in the shape of Presbyterianism, was from the first the established religion; hence it does not present itself to us in that country as a struggling, suffering, antagonistic, and protesting force; nor in point of fact, was the name P. ever given even to the extremest sect of Covenanters. See PRESBYTER: PRESBYTERIAN CHURCH, etc.: PRESBYTERIANISM.—See Neale's *History of the Puritans*; Price's *History of Nonconformity*; Macaulay's *History of England*; and *Dr. Stoughton's Works*.

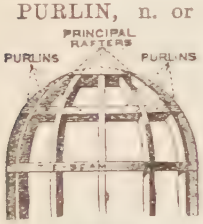
PURITY: see under PURE.

PURL, v. *pėrl* [Ger. *perlen*, to bubble: Sw. *porla*, to simmer, to bubble: Dut. *borrelen*, to bubble: an imitative word]: to flow or run with murmuring broken sounds, as water among small stones; to murmur; to rise or appear in undulations; to curl: N. the continued murmuring sound of a shallow stream of water running over small stones; ooze; soft flow: beer or ale warmed with a little milk, and a small quantity of gin, rum, or brandy, and flavored with an aromatic bitter, named from its foaming like shallow water running over small stones—now little used except among the lower classes in and near London. PURL'ING, imp.: ADJ. murmuring; curling: N. the gentle sound of shallow water running over small stones. PURLED, pp. *pėrld*.

PURL, v. *pėrl* [probably connected with the root of *pirouette*, from the idea of spinning]: in *hunting slang*, to upset.

PURL, n. *pérl* [corruption of PURFLE, which see]: a kind of edging used for lace; lace which has one of its edges purled: V. to decorate with fringe or embroidery.

PURLIEU, n. *pér'lū* [a corruption of the OF. *puralée*, a perambulation: F. *pour*, for; *allée*, a walk—from *aller*, to go]: land which, having once been part of a royal forest, was severed from it by a perambulation, and so was made free from forest laws; an inclosure; a certain limited exent of district; the confines or borders of any place.



Purlins.

PURLIN, n. or PURLINE, n. *pér'lin* [F. *pour*, for; *ligne*, a line]: in *carpentry*, one of the pieces of timber in framed roofs, that lie across the rafters on the inside to keep them from sinking in the middle.

PURLOIN, v. *pér-loyn'* [OF. *purloignier*, to prolong, to retard—from *pour*, for; *loin*, far—from L. *longus*]: to make away with; to appropriate to one's self; to steal. PURLOIN'ING, imp.: N. the act of one who purloins; theft. PURLOINED', pp. *-loynd'*. PURLOIN'ER, n. *-ér*, one who purloins; a thief.

PURMEREND, *pér'méh-rönt*: flouri-hing little town in n. Holland, 10. m. n. of Amsterdam, and on the line of the great canal from that city to the North Sea. Pop. (1880) 5,900. It has trade in cheese, butter, eggs, cattle, and wood—more than 1,500,000 lbs. of cheese being annually sold in the market. In the neighborhood are the richest meadows, the finest cattle, the neatest farm-houses, and the most perfect dairies and cow-stables. P. has also considerable shipping trade, and imports timber. The town, which sprang up under the protection of the castle of Purmerstein (built at the beginning of the 15th c.), was named from its situation at the end of the Purmer, formerly a sheet of water, but by drainage made a fertile tract of land containing 6,701 acres.

PURNEAH, *pér'nē-a*: large town of Brit. India, cap. of the extensive and populous district of P. in the presidency of Bengal, on the n. bank of the Ganges, and on both banks of the Little Kosi river, 230 m. n.n.w. of Calcutta. It covers a considerable area, but is not compactly built, there being numerous plantations, gardens, and other open places within the boundaries. Around the town are numerous straggling villages. Much indigo is grown in the vicinity. The civic establishment consists mostly of Europeans. Pop. of town about 16,000; of dist. (1881) 1,848,687.

PURPLE, n. *pér'pl* [F. *pourpre;* OF. *porpre;* It. *porpora*—from L. *pur'pūra;* Gr. *por'phura*, the purple-fish, purple]: color formed by blending red and blue (see PURPLE COLORS): a purple dress or robe, worn exclusively by the Roman emperors—hence, imperial power: ADJ. red or livid; dyed with blood: V. to make or dye purple; to clothe with purple. PUR'PLING, imp. PUR'PLED, pp. *-pld:* ADJ. colored with, or as with purple. PUR'PLISH, a. *-plish*, somewhat purple. BORN IN THE PURPLE, an epithet applied to the children of royal personages when born during their father's reign. PURPLE-BLACK, a preparation of madder, of a deep purple hue, approaching to black. PURPLE-LAKE, a purple prepared from cochineal. PURPLE OCHRE, or MINERAL PURPLE, a deep ochre from the Forest of Dean, Gloucestershire, England.

PURPLE COLORS: various shades of purple produced by painters in oil and water colors by admixture of pure red and pure blue. Dyers obtain this color from various sources, all curious and interesting. From a very early period, purple has been one of the most high prized colors, and came to be the symbol of imperial power. Probably one great reason for this was the enormous cost of the only purple color known to the ancients, the Tyrian purple, which was obtained in minute quantities only from a Mediterranean species of molluscous animal or shell-fish, the *Murex trunculus*, and perhaps also *Purpura lapillus*. In the time of Cicero, wool double-dyed with this color was called *dibapha*, and was so excessively dear, that a single pound-weight cost a thousand denarii, or about $175. A single murex yields only a small drop of the secretion, consequently great numbers had to be taken to obtain enough to dye even a little wool. Tarentum, the modern Otranto, was one of the great murex fisheries of the Romans, and there they had a number of large dyeing establishments. Vast heaps of the shells have been discovered there, remains of its former industry. With the decline of the Roman empire, the employment of this purple color ceased, and it was not until a Florentine, Orchillini, discovered the dyeing properties of the lichen now called Orchella Weed, that a simple purple color was known in Europe. The discovery was kept secret in Italy for nearly a century, and that country supplied the rest of Europe with the prepared dye, which received the name Orchil or Archil (q.v.). The color was very fugitive, and soon ceased to be used by itself; but was found very serviceable in combination, and has a remarkable power of brightening other colors. Many improvements have been made in archil dyeing, especially in fixing it; but its value has been greatly lessened by discovery of the beautiful series of purples yielded by coal-tar as results of the combination of one of its products called aniline with other bodies. See DYEING.

PURPLE EMPEROR (*Apatura Iris* or *Nymphalis Iris*); one of the largest of European butterflies, and one of the most richly colored. The expanse of wings is $2\frac{1}{2}$ to $3\frac{3}{4}$ inches. The wings are strong and thick, and the flight

Purple Emperor (larva and pupa shown below).

more sustained than that of many butterflies. The P. E. is very often seen about the tops of oak-trees.

PURPLE OF CASSIUS, or GOLD PURPLE: beautiful coloring material of vitreous character, made known in Germany in the 17th c. by an artist named Andrew Cassius. Its property is to give a beautiful ruby red to glass; and it is used to make imitation rubies, also in porcelain painting or enamelling, and in glass staining. It is made by combining one part of neutral chloride of gold with a mixture of one part of protochloride and two parts of perchloride of tin, all in solution, whence results the beautiful purple precipitate. The French recipe, said to be the best, is 10 parts of acid chloride of gold dissolved in 2,000 parts of distilled water: to this add a solution, carefully prepared, in another vessel, of 10 parts of pure tin in 20 parts of muriatic acid diluted with 1,000 parts of water: on mixing the two, the purple precipitate is thrown down, and is separated by filtering and decantation.

PURPLES, n. plu. *pêr'plz*, called also EAR-COCKLES or PEPPERCORN: disease affecting the grains of wheat, in which the grains become first dark-green, and ultimately black, caused by the animal parasite *Vib'riō tritĭcī*, or eel of the wheat (see EAR-COCKLES): petechiæ, or spots of a livid red on the body. LONG PURPLES, in *OE.*, perhaps the *Arum mac'ulātum*, ord. *Arācĕæ*; called also *lords-and-ladies, cuckoo-flower, cuckoo-pint*, etc.

PURPLE WOOD, or PURPLE HEART: the heart wood of *Copaifera pubiflora* and *C. bracteata*, a very handsome wood of rich plum color. The trees producing it are natives of Brit. Guiana, where the wood is called generally *Mariwayana*. The trees are rather rare on the coast, but common in the upland forests. The chief interest of the wood is its remarkable adaptation to the purposes of artillery and firearms. It is said no wood is better adapted for mortar-beds and gun-carriages, as it sustains better than any other the violent concussions to which they are subjected. It is used in making ramrods for muskets. Its great beauty and smooth grain fit it for cabinet-work, though it has been little used.

PURPORT, n. *pĕr′pŏrt* [OF. *purport*, purport: F. *pour* for; *porter*—from L. *portārĕ*, to carry]: design; tendency of anything said or written; import; meaning: V. to mean; to import; to signify. PUR′PORTING, imp. PUR′PORTED, pp.

PURPOSE, n. *pĕr′pŭs* [OF. *pourpos*, a design: F. *proposer*, to purpose or design: L. *propositum*, a purpose, a design—from *pro*, before; *positus*, laid or placed; *ponĕrĕ*, to place]: design; intention; end or aim desired; effect; in *OE.*, instance; conversation; discourse; enigma: V. to determine on some end or object to be accomplished; to resolve; to intend. PUR′POSING, imp. PURPOSED, pp. *pĕr′pŭst*: ADJ. intended. PUR′POSELESS, a. *-lĕs*, without any end or object in view. PUR′POSELY, ad. *-lĭ*, by design. ON PURPOSE, ad. designedly. CROSS PURPOSES, contrary objects in conversation or action.—SYN. of 'purpose, n.': design; end; intention; aim; motive; plan; measure.

PURPRESTURE, n. *pĕr-prĕs′tūr*, or POURPRESTURE, n. *pôr-prĕs′tūr* [F. *pour*, for; *prendre*, to take]: in *law*, an encroachment; the taking part of the common property into one's own possession.

Purpura:
Shell of *P. persica*; an animal of *P. hæmostoma*.

PURPURA, *pĕr′pū-ră*: genus of gasteropodous mollusks, of family *Buccinidæ*. The species are very similar

to those of the genus *Buccinum* (see WHELK), but have less elongated shell and a flattened columella, pointed at the base, forming there, with the outer lip, a canal excavated as a notch in the shell, and not projecting. The species are numerous, mostly natives of the shores of warm climates. *P. lapillus* is smooth and whitish, with bands of reddish-brown, and sometimes two inches long. It feeds on mussels and other mollusks, boring their shells with its proboscis. The genus is interesting, because some species of it were among those which yielded the famous *Tyrian purple* of the ancients. *P. patula* is supposed to have been one of those from which this dye was obtained, but it may have been obtained from others, as *P. lapillus*. The dye is contained in a small vein-like sac near the head. See PURPLE COLORS.

PURPURA, n. *pĕr-pū-rā*, or THE PURPLES [L. *pur'pŭră*; Gr. *por'phura*, the shell-fish that yields purple]: in *med.*, disease often erroneously placed among diseases of the skin. It is in reality a blood disease; and is characterized by the appearance of small round spots, of deep purple color, seen first and most abundantly on the legs, afterward extending to the arms and trunk. They are accompanied by no local pain, are not effaced by pressure (being due to a drop of blood extravasated beneath the cuticle or in the structure of the skin itself), do not rise above the surrounding surface, and are sometimes intermixed with livid patches resembling bruises; and, before disappearing, both the round spots and the patches undergo the same change of color which a bruise undergoes. These spots are not peculiar to the skin, but sometimes occur on internal surfaces and in the tissues of viscera. Passive hemorrhages from the mucous membranes frequently accompany the external symptoms. There is usually much debility, and often great tendency to faintness. The duration of the disease varies from a few days to a year or more. Slight cases are devoid of danger; and even the hemorrhagic cases usually recover, unless the bleeding has been excessive, or the blood has been extravasated into a vital organ.

The causes of this disease are obscure. The treatment varies, but the main indication always is to correct the condition of the blood. When there is reason to believe that the disease is dependent on depressing influences, a nutritious diet, tonics, and stimulants are required; and chalybeates, or the mineral acids, and quinine, with plenty of exercise in the open air, should be prescribed. When, however, there is no evidence of any debilitating cause, and the pulse is hard, the most efficient treatment consists in abstinence and purgatives. In cases of a mixed nature, a mixture of the oil of turpentine and castor-oil, in free doses (2 drachms of the former to 5 or 6 drachms of the latter), and iced drinks, or the sucking of small pieces of ice, have been strongly recommended. If the hemorrhage is not stopped by the oil of turpentine, gallic acid, or acetate of lead and opium,

must be prescribed; and if it proceeds from accessible parts, local measures also, such as the employment of ice or strong astringents, should be employed.

PURPURIC, a. *pėr-pū'rik:* of or pert. to purpura; applied to an acid of a purple color obtained from the excrement of the boa-constrictor, and from urinary calculi. PURPURATE, n. *pėr'pū-rāt*, a salt of purpuric acid. PURPURE, in *her.*, the color purple, expressed in engravings by lines in bend sinister.

PURPURIN, *pėr'pū-rin* [L. *purpura*, 'purple-fish,' purple dye, and term. *in*]: a red dyestuff, $C_{14}H_8O_5$; oxyalizaric acid. It is known in commerce as 'alizarine, yellow shade,' distinguished from alizarin proper, which is of blue shade (of red). P. occurs in old madder root associated with Alizarine (q.v.), from which it may be separated by a boiling alum solution, in which the alizarine is insoluble. It is formed artificially from artificial alizarine by oxidation with manganese dioxide and sulphuric acid at 284°—320° F. It crystallizes from aqueous alcohol in reddish yellow prisms containing water. P. is somewhat more soluble in water than is alizarine; in alcohol, ether, and alkalis it dissolves with red color; forms purple-red precipitates with lime-water and with baryta-water; dyes aluminous mordant scarlet to dark red; heated with zinc-dust it is reduced to anthracene. PSEU'DO-PUR'PURIN [Gr. *pseudes*, false,] ($C_{20}H_{12}O_9$): compound obtained with purpurin when the latter is extracted from madder. It is insoluble in alcohol, soluble in benzene, from which it crystallizes in brick-red needles. With mordants it forms an instable coloring matter. PURPUROXANTHIN, *pėr-pėr-ŏks-ăn'thin*, or XANTHOPURPURIN, *zăn-thō-pėr'pėr-in* [L. *purpura*, purple: Gr. *xanthos*, yellow], ($C_{14}H_8O_4$): compound existing in small quantity in madder. Artificially it is formed from purpurin by reduction with stannous chloride in alkaline solution. It occurs in yellowish-red aciform crystals, the melting point of which is 504° F., and which dissolve with red color in alkalis and in baryta-water.

PURR: see PUR.

PURRE: see DUNLIN.

PURSE, n. *pėrs* [F. *bourse;* It. *borsa;* Sp. *bolsa*, a purse—from Gr. and L. *bursa*, a hide, a skin]: a small money bag or case; a sum of money given as a prize or present; in *Turkey*, the sum of 500 piasters: V. to put into a purse; to contract into folds or wrinkles, like the mouth of a purse. PURS'ING, imp. PURSED, pp. *pėrst.* PURSER, n. *pėrs'ėr*, officer who keeps the accounts of the ship to which he belongs, and who acts as general purveyor—now in the navy called a *Paymaster* (q.v). PURSE'FUL, n. *-fŭl*, as much as can be contained in a purse; enough to fill a purse. PURSE-PROUD, a. puffed up by wealth. PURSE-NET, a net that can be closed like a purse. LONG or HEAVY PURSE, wealth; riches. LIGHT PURSE, poverty; want of resources.

PURSE-CRAB (*Birgus*): genus of (*Crustacea*, of order *Decapoda*, sub-order *Anomura* (see CRAB): allied to Hermit-crabs (q.v.), but having the abdomen or *tail* shorter and almost orbicular, its under surface soft and membranous, its upper surface covered with strong plates, which overlap one another as in lobsters. The first pair of legs have large and powerful pincers: the pair of legs nearest the abdomen are very small, but terminated by rudimentary pincers: the pair next to them larger, with small pincers; the second and third pair of legs are terminated by a single nail. A species of P. (*B. latro*) is found in Mauritius and in the more eastern islands of the Indian Ocean. It is one of the largest of crustaceans, sometimes two or three ft. in length when fully stretched out, and capable of erecting itself to the height of 12 inches from the ground, which it readily does if irritated, retreating backward, and exhibiting to the utmost its powers of offense or defense. It is of yellowish-brown color, its limbs covered with little blackish projections. It is never found far from the sea, which it is said to visit in order to moisten its gills; but it resides on land, and often in holes under the roots of trees, where it accumulates great quantities of the fibres of the cocoa-nut husk, as if to keep itself warm, or for a soft bed. The Malays rob these stores to supply themselves with junk. The gills of the P. are contained in a very large cavity, of which they fill only a very small part. Its food consists of cocoa-nuts and other nuts, which it climbs trees to procure. Its manner of dealing with a cocoa-nut is described as exhibiting a remarkable instinct, as it always begins to tear off the husk at the end where the *eyes* are. It is variously stated that it makes a hole through the eye from which the nut would germinate, and then scoops out the nut with the small pincers of its fourth pair of legs; and that having made this hole, it seizes the nut by one of its great pincers, and breaks it against a stone. Both statements may perhaps be true.

Purse-crab (*Birgus latro*).

PURSINESS: see under PURSY.

PURSLANE, n., or PURSLAIN, n. *pərslān* [L. *portulāca*, purslane: It. *porcellana:* OF. *porcelaine*], (*Portulaca*): genus of plants of nat. order *Portulaceæ*, having a bifid calyx, 4 or 6 petals, 8 or 16 stamens, and a capsule dividing around the middle. COMMON P. (*P. oleracea*) grows in cultivated and waste grounds on the sea-shore, in almost all tropical and subtropical parts of the world. It is cultivated as a pot-herb. It is a short-lived annual.

with spreading and rather procumbent stems, and obovate fleshy leaves, which, as well as the young shoots, are used in salads. The young and tender shoots are pickled in France like gherkins.

PURSUE, v. *pėr-sū'* [F. *poursuivre;* OF. *porsuir*, to pursue—from mid. L. *prosequĕrĕ*—from L. *persĕqui*, to follow up]: to go or proceed after; to follow with a view to overtake; to chase; to prosecute: to follow as an example; to strive to reach or gain; to go on; to proceed. PURSU'ING, imp. PURSUED, pp. *-sūd'*. PURSU'ER, n. *-sū'ėr*, one who follows or pursues; in *Scotch law*, a plaintiff. PURSU'ABLE, a. *-ă-bl*, that can be followed or prosecuted. PURSU'ANT, a. *-sū'ănt*, agreeable; conformable; done in consequence of anything. PURSU'ANCE, n. *-ăns*, process or continued exertion to reach or accomplish a thing. PURSUIT', n. *-sūt* [F. *poursuite*]: the act of following in haste, either in sport or in hostility; endeavor to attain or gain; course of business or occupation. IN PURSUANCE OF, a legal expression signifying 'in consequence of' or 'in fulfillment or execution of.'—SYN. of 'pursue': to follow; chase; seek; persist; proceed; prosecute; continue; persecute; go on.

PURSUIVANT, n. *pėr'swē-vănt* [F. *poursuivant*, a pursuer, a prosecutor—from *poursuivre*, to follow or pursue (see PURSUE)]: third and lowest order of heraldic officers, attendant on the heralds. The office was instituted as a novitiate, or state of probation through which the offices of herald and king-at-arms were ordinarily to be attained. There are four pursuivants belonging to the English College of Arms: *Rouge Croix*, the oldest, named from the Cross of St. George; *Blue-mantle*, instituted either by Edward III. or Henry V.; *Rouge Dragon*, deriving his title from King Henry VII.'s dexter supporter, a red dragon; and *Portcullis*, named from a badge of the same monarch.

In ancient times, any great nobleman might institute his own P. with his own hands and by his single authority. The Dukes of Norfolk had a P. called *Blanch-lyon*, from the white lion in their arms; the P. of the Dukes of Northumberland was styled *Espérance*, from the Percy motto; and Richard Nevil, Earl of Salisbury, had a P. called *Egle vert*. The term P. is applied sometimes to a formal state messenger.

PURSY, a. *pėrs'i* [OF. *pourcif;* F. *poussif*, short-winded: Dut. *bulsen*, to hack and cough: It. *bolso*, broken-winded—from L. *pulso*, I push or beat]: corpulent and short-winded; puffy; bloated. PURS'INESS, n. *-nĕs*, fatness, with shortness of breath.

PURTENANCE, n. *pėr'tĕ-năns* [an abbreviation of *appurtenance*]: in *Script.*, the pluck of an animal—that is, the lights or lungs.

PURULENT, a. *pū'rū-lènt* [F. *purulent*—from L. *purŭ-lentus*, full of corrupt matter—from *pus*, the viscous matter of a sore, *pūris*, of matter: It. *purulento*]: consisting of pus or matter; full of or resembling pus. PU'RULENCE, n. *-lēns*, or PU'RULENCY, n. *-lēn-si*, the generation of pus or matter. PU'RULENTLY, ad. *-lī*.

PURŪRAVAS, *pō-rō-rā'vas*: legendary king of ancient India; according to tradition, son of the planet Budha, or Mercur, by Ilâ—a name of the earth. He was renowned for liberality, devotion, magnificence, truthfulness, and personal beauty; but still more for his love for the Apsaras Urvas'î, a heavenly nymph. The absurd legend of their love, their woful separation through malign influences, and their final reunion, is adverted to in the Vedas, and related with more or less detail in the *Mahâbhârata* and the *Purâ'as* (see, e.g., Wilson's *Vishn'u Purâ'a*: it is likewise the subject of the celebrated drama of Kâlidâsa, the *Vikramorvas'î*. An attempt has been made to trace some affinity between this myth and that of Daphne pursued by Apollo. It has been suggested that the idea on which the original Hindu myth is based—apart from the semi-historical and fantastical detail by which it was overgrown—seems to have been suggested by the (supposed) motion or wanderings (Purûravas) of the sun, attracting or absorbing, and thus uniting, as it were, with the vapors floating in the sky (*Apsaras*—see Goldstücker's *Sanskrit Dictionary*, under 'Apsaras').

PURUS, *pō-rōs'*, RIVER: tributary of the Amazon, rising in s. Peru, about lat. 14° s., flowing n.e. along the borders of Peru and Bolivia into Brazil, where it empties through five mouths, the delta formed by these being nearly 100 m. in length. It is the most important branch of the Amazon w. of the Madeira, with which it flows parallel for nearly half its course. It is said to be navigable a great part of its length of about 2,000 m.; but its region has been but little explored. It is supposed to be the Amam-mayer of the Incas, and the Madre de Dios of the Spaniards.

PURVEY, v. *pėr-vā'* [F. *pourvoir*; OF. *purveoir*, to provide for—from L. *prōvidĕrĕ*, to purvey or provide for—from *pro*, forward; *vidĕrĕ*, to see]: to provide; to buy in provisions; to supply, as provisions. PURVEY'ING, imp. PURVEYED', pp. *-vād*. PURVEY'OR, n. *-vā'ėr*, one who provides victuals; an officer who formerly procured provisions for the Brit. royal household. ARMY PURVEYOR, formerly one of the officials in the British army who superintended the civil affairs of army hospitals. PURVEY'ANCE, n. *-ăns*, procurement of provisions; victuals provided.

PURVIEW, n. *pėr'vū* [F. *pourvu*, provided—from *pourvoir*, to provide]: the provisions or body of an act of parliament, beginning with 'Be it enacted,' as distinguished from the *preamble*; the limit or scope of a statute.

PUS, n. *pŭs* [L. *pus*, the viscous matter of a sore: Skr. *puy*, to have an ill smell]: well-known product of inflammation, occurring as a thick yellow creamy fluid, differing from all other morbid exudations in containing a large number of corpuscles, having a soft and fatty feeling when rubbed between the fingers, a peculiar odor, usually an alkaline reaction, and a specific gravity of about 1·032. Like the blood, it consists of certain definite microscopic elements, and of an intercellular fluid or serum in which they swim.

The microscopic elements are: 1. The pus-corpuscles, which, both in their microscopical and in their chemical relations, seem identical with the lymph-corpuscles, or colorless blood-cells; in diameter, they range from 0·004 to 0·005 of a line, and each corpuscle consists of a cell-wall, which often appears granular, of viscid transparent contents, and of a nucleus adherent to the cell-wall, and which can be rendered much more apparent by addition of acetic acid: 2. Molecular granules: 3. Fat-globules. The serum of pus is perfectly clear, of slightly yellow color, and coagulates on heating into a thick white mass.

The chemical constituents of P. are water (varying from 769 to 907 in 1,000 parts); albumin (from 44 to 180); fats (from 9 to 25); extractive matter (from 19 to 29); and inorganic salts (from 6 to 13); in addition to which mucin, pyin, glycin, urea, etc., are occasionally present. Of the inorganic or mineral constituents, the soluble salts are to the insoluble in the ratio of 8 to 1, and the chloride of sodium (the chief of the soluble salts) is three times as abundant as in the serum of the blood. For the mode of formation of pus, see SUPPURATION.

PUSEY, *pū'zi*, EDWARD BOUVERIE, D.D.; Anglican divine, regius prof. of Hebrew at Oxford, and canon of Christ-Church: 1800–1882, Sep. 16; b. near Oxford; grandson of the Earl of Harborough. P. was one of the chief promoters of the high-church movement in the Church of England. He was educated at Eton; thence proceeded to Christ-Church, Oxford, where he obtained a first class in classics 1822, and gained the univ. prize for a Latin essay 1824. He was afterward elected fellow of Oriel; and 1828 was appointed to the regius professorship of Hebrew, to which a canonry at Christ-Church is annexed.

Dr. P.'s first publication was on the *State of Religion in Germany*, the result of a visit to that country, which appears to have greatly influenced him to resist the progress of Rationalism. In 1835 he became a contributor to *Tracts for the Times* (in union with J. H. Newman, Keble, Williams, etc.), of which Nos. 67 and 69, *On Holy Baptism*, and Nos. 18 and 66, *On the Benefit of Fasting*, were written by him (see TRACTARIANISM). He was also one of the editors of *Library of the Fathers* and *Library of Anglo-Catholic Theology*. In consequence of a sermon on *The Holy Eucharist, a Comfort to the Penitent*,

preached before the univ. 1843, he was suspended from preaching by the vice-chancellor for three years, on the allegation that his language on the subject of the Real Presence was beyond what is sanctioned by the Formularies of the Church of England. Dr. P., however, protested against the proceeding, and appealed to the teaching of English divines. His other principal works are: *Remarks on the Benefits of Cathedral Institutions*; two treatises on the *Royal Supremacy in Spiritual Matters*; treatise on the *Ancient Doctrine of the Real Presence*; *Letters to the Archbishop of Canterbury, the* (late) *Bishop of Oxford, and the* (late) *Bishop of London, in Defence of Church Principles*; *On Marriage with a Deceased Wife's Sister*; *On the Use of Private Confession in the English Church*; translations of several foreign devotional works adapted to the use of the English Church; *History of the Councils of the Church*; *Commentary on the Minor Prophets*; *Lectures on the Prophet Daniel*; *Catalogue of Arabic MSS. in the Bodleian Library*; and numerous sermons. P. was for more than half a century one of the chief powers in the Church of England and in English religious life, being regarded by some as the reformer, and by others as the heresiarch. He was a man of austere but saintly spirit, and of profound scholarship. He was munificent in charities. Puseyism was long the usual name for the Tractarian movement (see TRACTARIANISM); and Puseyite was used even by Ritualists (see RITUALISM), though P. had little personal sympathy with this development of the Tractarian tendency.

PUSEYISM, n. *pū'zē-izm*: the principles of the late Dr. *Pusey* and his followers, whose object is to bring the Church of England in discipline and doctrines to the state in which it was on its first separation from the Church of Rome. PUSEYITE, n. *pū'zē-īt*, one who holds the principles of Dr. Pusey, and endeavors to introduce them into the Church of England.

PUSH, n. *pŭsh* [F. *pousser*, to push: It. *bussare*, to knock—from L. *pulsāre*, to push, to beat]: a thrust; a shove; any pressure, impulse, or force employed; a vigorous effort; a sudden emergency; in *OE.*, an assault; a forcible onset; a trial; an extremity: V. to press against with force; to urge or drive; to make a thrust; to enforce; to press forward; to make an attack; to importune. PUSH'ING, imp.: ADJ. pressing forward in business; enterprising; forcing one's way: N. the act of forcing one's way in business, or into a position in society. PUSHED, pp. *pŭsht*. PUSH'ER, n. *-ėr*, one who pushes. PUSH'INGLY, ad. *-li*. To PUSH DOWN, to overthrow by pushing. To PUSH ON, to drive or urge forward; to hasten.—SYN. of 'push, v.': to shove; propel; drive; urge; press; impel; butt; importune.

PUSH, n. *pŭsh* [probably a corruption of *pustule*, which see: according to Skeat, from F. *poche*, a pustule]: a little swelling, pustule, or pimple.

PUSHKIN, *pŏsh'kĭn*, ALEXANDER SERGEJEVITCH: Russian poet: 1799, May 26—1837, Jan. 29 (Feb. 10); b. Moscow, of good family. He was educated at the imperial lyceum of Tsarskoe Selo, where he acquired reputation more for his liberal opinions than for his attention to study. In 1817 he entered govt. service, and soon became one of the most prominent figures in fashionable society. In 1820 he published a popular romantic poem, *Ruslan and Liudmila*. Next came *Prisoner of the Caucasus* (1822); *Fountain of Bakhtchiserai* (1824); *Tzigani* (The Gypsies, 1827); and *Eugene Onegin* (1828, Eng. transl. 1881), humorously sarcastic description of Russian society—after the fashion of Byron's *Beppo*. In 1829, he published *Poltava*, which has Mazeppa for its hero. About the same time, he wrote a dramatic poem, *Boris Godunov*, one of the best of his works; but subsequent to this he appears to have addicted himself almost wholly to prose; and from being or seeming an enthusiastic 'liberal,' he passed—after his appointment to the office of imperial historiographer, with a pension of 6,000 rubles—to the extreme of Russian conservatism. He was mortally wounded in a duel, and died at St. Petersburg. P. is reckoned the finest Russian poet of the 19th c. His countrymen call him the 'Russian Byron,' and he has not a little of the bold and brilliant genius of his prototype, excelling like him in vigor of imagery and impassioned sentiment.

PUSHTOO, n. *pŭsh'tô*: the Afghan group of languages.

PUSILLANIMOUS, a. *pū'sĭl-lăn'ĭ-mŭs* [L. *pūsillus*, very little, petty; *animus*, courage, spirit: It. *pusillanimo*; F. *pusillanime*, pusillanimous]: mean-spirited; without firmness or courage; cowardly. PU'SILLAN'IMOUSLY, ad. *-lĭ*. PU'SILLAN'IMOUSNESS, n. *-nĕs*, or PU'SILLANIM'ITY, n. *-lăn-ĭm'ĭ-tĭ* [F. *pusillanimité*, cowardice—from L.]: want of firmness and strength of mind; weakness of mind; want of courage.—SYN. of 'pusillanimity': cowardice; timidity; fear; weakness; mean-spiritedness;—of 'pusillanimous': cowardly; timid; weak; feeble; mean-spirited; dastardly; faint-hearted.

PUSS, n. *pŭs* [Dut. *poes*; Low Ger. *puus*, a familiar name for a cat: Gael. *pus*, a cat: an imitative word, from the noise of the cat spitting]: the familiar name for a cat; a hare. PUS'SY, n. *-sĭ*, a diminutive of puss.

PUS'TULAR DISEASES: the cutaneous diseases which are characterized by *pustules*, or circumscribed elevations of the cuticle, containing pus; they are Ecthyma, Impetigo, Acne, and Sycosis: see these titles. Pustules occur also in small-pox, and occasionally in chicken-pox; but these are on good grounds regarded as febrile diseases, in which the eruption on the skin is not the primary disorder. Boils (q.v.), though not included under 'pustular diseases,' are in their nature pustular.

PUSTULE, n. *pŭs'tūl* [F. *pustule*, a pustule—from L. *pus'tula*, a blister, a pimple—from *pus*, the matter of a sore: It. *pustula*]: a small elevation of the skin or cuticle containing pus; a small blister. PUS'TULAR, a. *-tū-lĕr*, or PUS'TULOUS, a. *-lŭs*, covered with pustules. PUS'TULATE, v. *-lāt*, to form into pustules or blisters; to cover with blisters: ADJ. in *bot.*, covered with glandular excrescences. PUS'TULATING, imp. PUS'TULATED, pp. —See MALIGNANT PUSTULE.

PUT, v. *pŭt* [Gael. *put*, to throw, to push: F. *bouter*; OF. *boter*, to push, to thrust: It. *botta*, a stroke: Dan. *putte*, to put]: to lay; to place; to set; to propose, as a question; to offer; to reduce to any state; to bring to any state of mind; to shoot or germinate; in *OE.*, to put into action; oblige; urge. PUTTING, imp. PUT, pt. pp. TO PUT ABOUT, to turn; to change the course, as a ship; to occasion inconvenience, trouble, or worry. TO PUT AWAY, to discard; to expel; to divorce. TO PUT BACK, to hinder; to delay; to place in the former position, or in the proper one. TO PUT BY, to lay aside. TO PUT DOWN, to deposit; to repress; to silence; to bring into disuse. TO PUT FORTH, to extend; to shoot out or germinate; to exert; to propose; to publish. TO PUT FORWARD, to advance; to promote. TO PUT IN, to insert; to interpose; to place in due form before a court; to enter a harbor. TO PUT IN FOR, to stand as a candidate. TO PUT IN PRACTICE, to use; to exercise. TO PUT OFF, to delay or postpone; to lay aside; to divest; to discard; to push from land; to leave the shore. TO PUT ON, to invest; to assume; to impose; to promote; to hasten motion, as, *to put on* steam. TO PUT OUT, to eject; to shoot or sprout; to extinguish; to place at interest, as money; to protrude; to stretch forth; to publish; to disconcert; to expel. TO PUT OVER, to refer; to sail over or across; to do with a limited or insufficient supply for the time. TO PUT THE HAND TO, to take hold of; to begin. TO PUT TO, to add; to refer. TO PUT TO DEATH, to kill. TO PUT TO A STAND, to stop; to arrest by difficulties or obstacles. TO PUT TOGETHER, to unite; to connect; to accumulate into one sum or mass. TO PUT TO IT, to press hard; to distress; to perplex. TO PUT TO RIGHTS, to arrange, as objects in disorder. TO PUT TO SEA, to set sail; to begin a voyage. TO PUT TO THE SWORD, to kill with the sword; to slay. TO PUT TO TRIAL or ON TRIAL, to bring to a test; to try; to place under judicial examination. TO PUT TRUST IN, to confide in; to repose confidence in. TO PUT UP, to offer publicly; to store; to set in order; to hoard; to hide; in *Scot.*, to give lodgings to. TO PUT UP AT, to take abode at, as at a hotel. TO PUT UPON, to impose; to lay upon; to incite. TO PUT UP WITH, to receive patiently; to overlook or suffer without resentment; to take without dissatisfaction. A PUT OFF, an excuse; an evasion for delay. PUT ON, in *Scot.*, clothed; dressed.—SYN. of 'put': to lay; place; set; offer; cause; produce; ad-

vance; propose; state; impel; thrust; push; give up; surrender; utter; express; incite; entice; urge; oblige; force; constrain; steer; direct; reposit; repose; apply; comprise; consign; add; reduce; form; regulate.

PUT, n. *put* [Gael. *put*, to throw, to push, to place (see PUT 1)]: a certain game at cards; an action of distress: V. in *Scot.*, to throw, with the hand raised to the shoulder, a heavy stone, etc., in playing a certain outdoor game, or in a series of sports. PUT'TING, imp.: N. in *Scot.*, an outdoor sport, which consists in tilting a stone to a distance, the stone being held in the hand on a level with the shoulder. PUTTING-STONE, the stone used in the sport. PUT'TER, n. one who.

PUTAMEN, n. *pū-tā'mĕn* [L. *putāmen*, a pod or shell]: in *bot.*, the stone of a fruit, also called the endocarp.

PUTATIVE, a. *pū'tă-tĭv* [It. *putativo*; F. *putatif*, supposed—from mid. L. *putātīvus*, supposed—from L. *putātus*, supposed, imagined; *putārĕ*, to reckon]: supposed; reputed.

PUTCHUK, or PUTCHOCK, n. *pŭt'chŭk*: aromatic root, article of commerce in India, where it is used both as perfume and as medicine, and of export to China, where it is used for incense, as it gives out a very pleasant odor when burned. It appears to be the *Costus* (q.v.) of the ancients.

PUTEAL, n. *pū'tē-ăl* [L. *putĕal*—from *putĕus*, a well]: the inclosure surrounding the opening of a well to protect persons from falling into it.

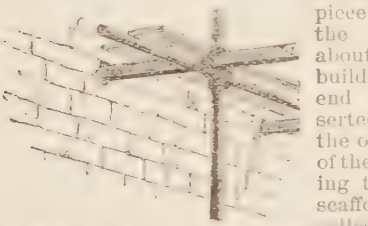
PUTEAUX, *pū-tō'*: town of France, dept. of Seine, about two m. from the w. boundary of Paris; on the left bank of the Seine, opposite the Bois de Boulogne. The situation is very pleasant, and many Parisians have fine villas here. Pop. and industrial activity have of late greatly increased. Pop. (1881) 15,586.

PUTE'OLI: see POZZUOLI.

PUT-IN-BAY ISLANDS, known also as the Wine Island group: group of ten islands in the w. portion of Lake Erie, and forming part of Ottawa co., O. The principal island, known as Put-in-Bay Island, covers nearly 2,000 acres, and is about 70 m. from Cleveland, 40m. from Toledo. The celebrated battle of Lake Erie (see ERIE, BATTLE OF LAKE) was fought near here, and the islands are said to have received their name from the fact that before and after the battle Commodore Perry (see PERRY, OLIVER HAZARD) 'put into' the harbor with his fleet. On Gibraltar, one of the smaller Islands, a monument in honor of Perry and his victory has been erected. The islands have only a moderate quantity of soil, lying on limestone; but both the ground and the climate are admirably adapted to the growth of the vine. The beauty of the scenery and the excellent facilities for boating and fishing have caused the islands to become notable summer resorts, and some fine hotels

and private mansions have been erected; but the principal business is the production of grapes and wine, though the fishing industry is of some importance. On North Bass I. and, known also as Isle of St. Ours, is a fine light-house. During the summer months, steamers ply daily between the islands and Buffalo, Cleveland, Detroit, and other lake cities. Pop. tp. and vil. (1890) 1,333.

PUTLOG, n. *pŭt'lŏg*, or PUT'LOCK, n. *-lŏk* [Eng. *put*, to insert; *log*, a thick piece of wood]: one of the pieces of timber, about 7 ft. long, used in building scaffolds, one end of which is inserted into the wall, and the other fastened to one of the upright poles, forming the skeleton of the scaffold. Apertures called putlog-holes are frequent in buildings of all ages.



a, Putlog; *b, b*, putlog-holes; *c*, ledger.

PUTNAM, *pŭt'nam*: town; Windham co., Conn.; on the Quinnebaug river and the New York and New England railroad; 26 m. s. by w. of Worcester, 33 m. n. by e. of Norwich. It was set off from Thompson, Pomfret, and Killingly, and incorporated 1855. It is principally engaged in agricultural and the manufacture of cotton, woolen, and silk goods, shoes, steam heaters, cutlery, cutters, carriages, and 1894 had a national bank (capital $225,000), 2 savings banks (deposits $2,044,879), 2 weekly newspapers, debt $73,505, and assessed valuation $4,031,801. Pop. (1880) 5,827; (1890) 6,512.

PUT'NAM, FREDERICK WARD: anthropologist: b. Salem, Mass., 1839, Apr. 16. He studied under Louis Agassiz, has been connected with various institutions, and held some state offices; but his principal work has been in Amer. archæology. Through his efforts, the Serpent Mound, in Adams co., O., with about 70 acres of land, was secured 1886 for the Peabody Museum at Cambridge, to be kept forever as a prehistoric monument and a public park. He became prof. of Amer. archæology and ethnology in Harvard Univ. 1886. He is a member of the National Acad. of Sciences, and of many other scientific bodies; was chosen sec. of the Amer. Assoc. for Advancement of Science 1873, pres. of Boston soc. of nat. hist 1887, and was chief of the dept. of ethnology at the Columbian Exposition 1893. He published many annual reports of associations, and more than 300 scientific papers.

PUT'NAM, GEORGE PALMER: publisher: 1814, Feb. 7—1872, Dec. 20; b. Brunswick, Me. He became a clerk in Leavitt's bookstore in New York 1828, and a member of the firm of Wiley & Putnam 1840. The next year he went to London, where he opened a branch establish-

ment, which he conducted till 1848, when the partnership was dissolved and he engaged in the publishing business alone in New York. He published many illustrated works, commenced the publication of *Putnam's Magazine* 1852, established the Loyal Publication Soc. 1861, and retired from business 1863, to become collector of internal revenue. Three years later he became head of the publishing firm of G. P. Putnam and Sons, in which he remained till his death. He labored long and earnestly to secure international copyright, was one of the founders of the Metropolitan Museum of Art, and was for some time sec. of the Publishers' Assoc. He wrote several works, among which was *Ten Years of the World's Progress: Supplement*, 1850-61, *with Corrections and Additions* (1861).

PUT'NAM, ISRAEL: soldier: 1718, Jan. 7—1790, May 19; b. Salem, the portion now Danvers, Mass. He had few educational advantages; was married at the age of 20, and the following year became a farmer in Pomfret, Conn. His fearlessness was shown by his entering at night the den of a wolf which had destroyed many of his sheep, and shooting the beast as it was about to spring upon him. He was an officer in the French war 1755, was in the battle of Lake George and the expedition against Crown Point. At the risk of his life, he prevented the explosion of a powder-magazine at Fort Edward 1757, was saved from the Indians after they had tied him to a tree and lighted a fire to burn him alive, and afterward rendered valuable services in Canada and in the W. Indies expedition 1762. In 1764 he was in command of a regt. from Conn. sent to aid Detroit, then under siege by Pontiac, and late in this year returned to his home. For some years he kept a country inn and for a time was member of the state legislature. He was an ardent friend of liberty, and on hearing the news of the fight at Concord unyoked the oxen with which he was plowing, and, leaving the plow in the furrow, rode on horseback to Cambridge, which place he reached early the next morning. He was appointed commander-in-chief of the Conn. forces, with the rank of brig.gen. The British made him various offers for his assistance, but they were indignantly refused. He took a leading part in the battle of Bunker Hill, was promptly commissioned maj.gen., after the evacuation of Boston was in command at New York, and was most unjustly blamed for the defeat on Long Island 1776, Aug. 27. The following winter, by order of congress, he fortified Philadelphia, was afterward stationed in N. J., whence he was sent to direct operations in the Highlands of the Hudson, where he won permanent renown by his prompt execution of Lieut. Edmund Palmer, a British spy. The capture by the British of the forts in the Highlands caused great dissatisfaction with him; but a court of inquiry decided that P. was not blamable for the disaster. He was afterward in command in Conn., and at Horseneck escaped

from Gen. Tryon by riding his horse down a stone stairway. In 1779, while returning to the army after a brief visit to his home, he was stricken with paralysis and laid aside from active service. He died at Brooklyn, Conn. His *Life*, by Col. Humphreys, was published 1818; by O. W. B. Peabody, in Sparks's *American Biography*, 1842; by W. Cutter, 1846; and by I. N. Tarbox, 1876.

PUT'NAM, RUFUS: soldier in the Amer. revolution: 1738, Apr. 9—1824, May 1; b. Sutton, Mass.; cousin of Gen. Israel P. He was trained as a millwright; at 19 enlisted in the war against the French, served 1757–60, and was made ensign. After the surrender of Montreal, he married, and settled as farmer and millwright in New Braintree, Mass., where he studied mathematics, navigation, and surveying. He sailed to Florida 1773, Jan., to explore lands supposed to have been granted to soldiers for service in the French war. He returned home at the outbreak of the revolution, and was made lieut.col. of one of the first regiments raised after the battles of Lexington and Concord, with David Brewer as col. His practical skill as an engineer made his services valuable in constructing works of defense at Roxbury; and Washington commended him to congress as more competent than any of the French officers in that line who had received appointments. From 1776, Mar. 20, he served as chief engineer at New York; and for the campaign of that summer superintended all the defenses in that region, with the rank of col. from August. In the autumn some discontent led him to quit his corps and take command of the 5th Mass. regt. The next spring he served with the northern army, and distinguished himself at the battle of Stillwater, in command of the 4th and 5th regiments of Nixon's brigade. With Gen. Putnam, 1778, he superintended the construction of West Point fortifications; and after the Stony Point surprise he commanded a regt. in the brigade of Gen. Wayne, to the end of the campaign. In 1782, Feb.—July, he was one of the commissioners to adjust the claims of citizens of New York for losses due to the allied armies; and 1783, Jan. 7, he was made brig.gen. During several years after the war, he was a member of the Mass. legislature, and served, 1787, as aide to Gen. Lincoln in the suppression of Shays's rebellion. In 1786, P., with a number of other officers in the American army, organized in Mass. the Ohio Company, for the purpose of having their respective bounty-lands located together in the undeveloped country w. of Penn., e. of the Mississippi, and n. of the Ohio. At the same time a movement was in progress in congress to organize this vast tract into the Northwest Terr., and provide for its subsequent division into 6 or 7 states. In the following year the Rev. Manasseh Cutler (q. v.) of Ipswich, Mass., acting for the Ohio Company, addressed congress (of which he was a member), and proposed to purchase 5,000,000 acres in the projected terr. if it was organized with a prohibition against slavery. The organizing act, with the anti-slavery

clause (known as the Ordinance of 1787), was adopted July 13, and Cutler's first purchase was two tracts aggregating 1,500,000 acres. P. was chosen supt. of the Ohio Company, and made the first permanent settlement in the e. part of the Northwest Terr., at Marietta, O. (q.v.), 1788, Apr. 7. He became Ohio supreme-court judge 1789; brig.gen. 1792, May 4, under Wayne, against the Indians; U. S. commissioner to make an Indian treaty 1792, May—1793, Feb.; executed an important treaty 1792, Sep. 27. He was U. S. surveyor-gen. 1793, Oct.—1803, Sep., and member of the Ohio constitutional convention 1803. He died at Marietta, O., last surviving gen. officer of the revolution except Lafayette.

PUTREFAC'TION: decomposition of organic substances, when such decomposition is accompanied by offensive odor. In other respects it is identical with Fermentation (q.v.). In the process of P. the organic compounds break up, producing others of lower order, inorganic compounds, and even simple elements. It may be prevented by exclusion of oxygen and moisture, by maintaining a freezing or boiling temperature, by the use of antiseptic substances, etc.

P. was long believed to be *spontaneous*—i.e., to depend on the supposed peculiar instability of organic matter and its affinity for oxygen. In all cases, however, certain organic ferments, the schizomycete fungi known as Bacteria (q.v.)—excessively minute, non-nucleated rods or spheres of protoplasm, inclosed in a cellulose envelope, and multiplying rapidly by transverse division—are found in enormous quantity. That their presence is not merely a concomitant, but the exclusive cause of the putrefactive process, is demonstrated by experiment. If we take an extremely putrescible fluid, e.g., infusion of fish or hay, and cork it up, it soon becomes turbid with bacteria, and acquires a characteristic odor; but if plugged with cotton wool, and boiled for a few minutes, to kill the bacteria and their germs present in the flask and its stopper, it may then be put aside for any number of years without a symptom of P.; but if the plug be then removed, even for a second or two, in the air of an ordinary room, and then replaced, germs enter, develop, and multiply, and decomposition immediately sets in. This explains how the minutest taint of decomposing matter is able to set up P. on the largest scale; since it contains living bacteria, which multiply with incredible rapidity, at the expense of the organic matter which they decompose. If the protoplasm of the bacteria be coagulated by heat or poisoned by application of antiseptics, no such inoculation can be effected; hence the putrefactive power is restricted to the living ferment, and does not exist in the products of its life. Hence the paradox, 'putrefaction is the result not of death, but of life.' We are still far from fully understanding the chemistry of the putrefactive disintegration of organic compounds. Probably the bacteria act, in the first place,

by removing oxygen and by causing the assimilation of water. Numerous forms and varieties of bacteria exist in nature, and each doubtless differs in its physiological activities. Many are known to enter the blood, causing definite diseases, splenic fever, phthisis, etc., while others poison wounds. The practice of medicine, and still more of surgery, has of late years been revolutionized through this knowledge, as has also the art of brewing; and our notions of hygiene, as well as of domestic and civic cleanliness, are consequently in process of rapid change. See ANTISEPTIC: GERM-THEORY: ETC.

PUTREFY, v. *pū'trē-fī* [F. *putréfier*, to putrefy—from mid. L. *putrefacāre*—from L. *putrēfacere*, to make rotten—from *puter*, rotten; *facĭō*, I make: It. *putrefare*]: to make corrupt or rotten; to rot. PU'TREFYING, imp.: ADJ. rotting; corrupting with rottenness. PU'TREFIED, pp. *-fīd*: ADJ. rotten; decomposed. PU'TREFIER, n. *-fī-ẽr*, one who or that which putrefies. PU'TREFAC'TION, n. *-fāk'shŭn* [F.—L.]: rottenness; the spontaneous decomposition of organic bodies (see above). PU'TREFAC'TIVE, a. *-tĭv*, tending to promote decomposition; making putrid or rotten. PU'TREFAC'TIVENESS, n. *-nĕs*, the state or quality of being putrefactive.

PUTRESCENT, a. *pū-trĕs'sĕnt* [L. *putrescens* or *putrescentem*, growing rotten—from *puter*, rotten]: becoming putrid or rotten; pertaining to putrefaction. PUTRES'CENCE, n. *-sĕns*, a putrid or rotten state. PUTRES'CIBLE, a. *-sĭ-bl*, liable to grow putrid.

PUTRID, a. *pū'trĭd* [F. *putride*—from L. *putrĭdus*, decayed—from *puter*, rotten: It. *putrido*]: rotten; corrupt; pertaining to rottenness. PU'TRIDNESS, n. *-nĕs*, or PUTRIDITY, n. *pū-trĭd'ĭ-tĭ*, corruption; rottenness. PUTRIDINOUS, a. *pū-trĭd'ĭ-nŭs* [L. *putrĭdo*, rottenness]: rotten; stinking. PUTRID FEVER (see JAIL FEVER).

PUTTEEALA, or PUTTIALA, *pŭt-tē-ā'la* (*Patiála*): native state in the Punjab, partly in the plains of the Sutlej, partly among the hills near Simla. Its cap., P., is a walled town. Pop. of state (1891) 1,538,810.

PUTTING, PUTTING-STONE: see under PUT 2.

PUTTING TO SILENCE, in the Law of Scotland: title of a suit or action of declarator, the object of which is to put an end to certain pretended claims of marriage. See (the corresponding term in Eng. law) JACTITATION.

PUTTOCK, n. *pŭt'tŏk* [so called from its preying on *pullets* or young birds: Scot. *pout*, a young grouse: Gael. *put*, a young moorfowl]: in *OE.*, a doubtful bird, but said to be the long-winged kite. PUTTOCK-SHROUDS, among *seamen*, small shrouds which go from one mast to the other—a supposed corruption of *futtock-shrouds*.

PUTTUN, or PATTAN, *pŭt-ŭn′*, or ANHULWAR PATTAN, *ân-hôl-wâr′ pŭt-ŭn′*: town of India, territory of the Guicowar, Guzerat, 64 m. n.w. from Allahabad. It stands on the Saraswati, a small river, a tributary of the Banas; and is a town of considerable importance, having manufactures of swords, spears, pottery of a light fine, kind, and silk and cotton goods. P. occupies part of the site of the ancient city of Anhulwara, the traces of the walls of which may still be seen, about five m. in circuit. Pop. (1881) 32,712.

PUTTY, n. *pŭt′ĭ* [F. *potée*, a glazier's putty, a mixture of clay and horse-dung for molds: Milanese, *poltïa*, batter, mud—from L. *puls* or *pultem*, pap, pottage: Gr. *poltos*, porridge]: pasty mass or thick cement formed of whitening and linseed-oil, with or without white-lead, used chiefly by glaziers for fastening glass in window-frames, as in time it becomes remarkably hard; and by painters for filling holes in wood before painting.—The term denotes also the mixture of dust and oil arising from the grinding of precious stones: in *pottery*, the mixture of ground materials in which earthenware is dipped for glazing: in *foundries*, the mixture of clay and horse-dung used in making molds: V. to fix or fill up with putty. PUT′TYING, imp. PUT′TIED, pp. *-tĭd*. PUTTY-POWDER, material, consisting of peroxide of tin, used for polishing stone and metal work; also as coloring material for white glass, and for the white enamels of porcelain, etc. It is made by melting tin; as the surface oxidizes, the scum, which is the peroxide, is raked off, and when cold, is reduced to a fine powder, white in color, and with particles extremely hard.

PUY, n. *pwē* [F.]: provincial term for the truncated conical hill-tops of Auvergne and the Cevennes in France, being mostly peaks of extinct volcanoes.

PUY, *pwē*, LE, or LE PUY-EN-VELAY, *lĕ pwē-ŏng-vĕh-lā′*: town of France, dept. of Haute-Loire, about 70 m. s.w. of Lyon; one of the most picturesque towns in Europe. It stands on the steep s. slopes of Mt. Anis, from whose summit starts up precipitously the huge basaltic mass *Rocher de Corneille*, crowned by a colossal figure of the Virgin, made of captured Russian cannon. The most notable building of Le P. is the cathedral, a splendid but heavy-looking structure of the 10th or 11th c.; in the highest part of the town, and remarkable chiefly for a wonder-working image of the Virgin (*Notre Dame du Puy*). Lace, bells, silk and wool are manufactured. Pop. (1891) 20,038.

PUY-DE-DÔME, *pwē-de -dōm :* large central dept. of France; 3,070 sq. m. Plateau and mountain occupy three-fourths of it; plain and valley the rest. Branches of the Cevennes and of the Auvergne Mountains overspread the e. and w. of the dept. The multitude of conical hills or puys, of basaltic and lava masses, and of craters, shows the volcanic nature of the soil: see AUVERGNE. The famous volcanic group of the Puy-de-Dôme, w. of Clermont, has two main peaks, the highest 4,617 ft. Mont Dore (5,885 ft.) is the chief summit of a s. group of mountains. The principal river is the Allier, tributary of the Loire. The soil is, in general, light and poor; but its volcanic character fosters vegetation; and the splendid valley of Limagne is fertile throughout. The climate is uncertain, and severe in the mountains. The principal mineral springs are iron, antimony, and lead. Hot and cold mineral springs are abundant; among the most frequented are those of St. Myon and Châteldon. The dept. is sub-divided into the arrondissements Ambert, Clermont, Issoire, Riom, Thiers.—Pop. (1881) 566,064; (1891) 564,266.

PUZZEL, n. *pŭz'ĕl* [a probable corruption of F. *pucelle*, a virgin]: in *OE.*, a disreputable or low woman; a drab.

PUZZLE, n. *pŭz'zl* [an imitative word taken from the *puddling* or troubling of water, the sound of *dd* and *zz* being easily interchanged, especially before *l - puzzle-headed* and *muddle-headed* being synonymous terms]: bewilderment; perplexity; something to try ingenuity; a riddle: V. to confuse; to bewilder; to be perplexed. PUZ'ZLING, imp. *-zling :* ADJ. bewildering; causing perplexity. PUZ'ZLED, pp. *-zld.* PUZ'ZLER, n. *-zlĕr*, one who or that which puzzles.—SYN. of 'puzzle, v.': to embarrass; bewilder; confound; confuse; perplex; entangle; nonplus.

PYÆMIA, n. *pī-ē' mĭ-a* [Gr. *puōn*, pus; *hai ma*, blood]: ultimate stage of 'blood-poisoning,' when bacteria in large quantities have entered the general circulation, have formed septic thrombi in the veins and have been disseminated with the production of multiple abscesses throughout the organs. The term 'blood-poisoning' is used in this somewhat restricted sense to indicate a febrile process, due to toxic secretions of germs of suppuration. Septic or suppurative fevers, sepsis, are synonyms; but no single, concise term is in common use. Blood-poisoning may be divided into three stages: 1. Septic toxæmia, or Sapræmia (*sapros*, rotten), in which the germs are lodged in a blood clot or a mass of decomposing matter in a wound, but have not infiltrated living tissues to any extent; 2. Septicæmia (*septos*, poisonous), in which the tissues about a wound have become infiltrated with germs, but the latter have not been absorbed into the general circulation; 3. P. in which the germs have entered the circulation and are growing in various organs. The stages mentioned cannot be sharply separated. The crucial test for P., in distinction from the

earlier stages, is the presence of multiple abscesses, due to the dissemination of bacteria.

Healthy blood can exterminate moderate quantities of bacteria. Hypodermatic injections ordinarily introduce a few hundred or a few thousand bacteria into the system, but it is only rarely and in the most enfeebled individuals that harm is done. Even pus may be injected into the circulation, without necessarily causing P. It is possible, however, for a case of septic fever to begin in the stage of P. Thus, in malignant endocarditis, bacteria enter the circulation in some unknown manner, and develop upon the lining membrane of the heart, producing signs of endocarditis, plus those of blood-poisoning. P. is not due to a single specific micro-organism; and may be caused by any germ capable of producing pus. Park enumerates ten bacteria that, under favorable circumstances, always produce pus, and fourteen—including the specific causes of typhoid fever, tuberculosis, erysipelas, pneumonia, anthrax, etc.—which may at least aid in suppuration. It is probable that several other germs may be the cause of sepsis, and it is well demonstrated that certain cases are due to the infection of at least two kinds of bacteria.

But in considering its causes, it is not enough to mention the bacteria, for comparatively few patients affected with typhoid, erysipelas, pneumonia, etc., develop P., while the bacteria of pus are found in air, water, and on practically everything else with which we come in contact, unless special pains have been taken to remove them. Under normal circumstances, germs are present on the skin or in the mouth and other cavities of the body which open externally, merely as foreign bodies. Small abrasions or cuts or slight local irritations, allow limited suppuration, as under a scab or in a boil, but the sapræmia is insignificant. Still, some fatal cases of P. have been traced to so slight causes as the excoriations made by the nails in scratching. Any depraved state of the constitution such as diabetes, anæmia, scurvy, chronic alcoholism, etc., increases both the tendency to local suppuration and to diffused blood-poisoning.

The symptoms of sepsis are general malaise, head ache, and fever of an irregularly remittent type. When the truly pyæmic stage is reached, chills occur at irregular intervals, supposed to mark the development of abscesses in various organs, the temperature rises to 105° or 106°, then drops even below normal, soon to rise again. There is nothing characteristic about the temperature curve, save its irregularity and the great excursions from the average. As blood-poisoning becomes profound, delirium usually sets in, the skin is bathed with clammy sweat, there is a fetid diarrhœa, the pulse is weak and rapid, and, while the particular symptoms may vary widely, the general condition is that described as 'typhoid.' Death usually results in coma. The duration is from one to ten days, the relative and absolute length of the pyæmic stage varying widely. Occasionally death is postponed for several weeks, rarely being averted. The patient is usually rational in the chronic form, though greatly prostrated.

In the treatment of P. it is necessary (1) to stimulate and nurish; (2 to combat the septic state by opening abscesses wherever accessible, and using antiseptics freely.

The prevention of septic fever consists in the practice of antiseptic surgery. Except where the disease develops without gross lesion, or where a deep wound has been infected with virulent germs at the start, every case of septic fever means an error in the carrying out of modern surgical principles, though not necessarily an error for which the surgeon can be blamed. For example, the patient may have disturbed the dressings. Septic fever is now comparatively rare; wounds inflicted by the surgeon now almost never suppurate; compound fractures in which amputation was considered by the older surgeons as the only feasible means of averting pyæmia, now usually heal without deformity, and little secondary danger is apprehended from wounds not deeply impregnated with filth. Moreover, operations within the peritoneum, pleura, and joints are successfully performed which, before the adoption of antiseptic methods, would have ended in pyæmia.

See Puerperal Fever: Antiseptics: Septicæmia: Phagocytosis.

PYAT, *pē-ä'*. Félix: 1810, Oct. 4—1889, Aug. 5; b. Vierson, France: communist. He was admitted to the bar, but chiefly wrote articles, feuilletons, and plays, often with strong political allusions. In 1848 he was a socialist sec. of the constituent assembly. He escaped to Switzerland and Belgium, and was a member of the 'European revolutionary committee,' returning to France 1869. In 1870 he was condemned to five years' imprisonment, but had already escaped. In 1871, he became a leader of the Paris communists, and on the fall of the Commune escaped to London. He was tried and condemned to death, in absence, but was pardoned 1880 and elected a deputy from Marseilles 1888.

PYCNIDE, n. *pĭk'nĭ-dē* [Gr. *puknos*, dense]: a wart-like, minute, cellular, reproductive body in the thallus of lichens. Pycnidia, n. plu. *pĭk'nĭd'ĭ-ä*, cysts containing stylospores, found in lichens and fungi.

PYCNITE, n. *pĭk'nīt* [Gr. *puknos*, dense]: a massive variety of topaz, of a dull-yellowish or reddish-white color.

PYCNODONTS, n. plu. *pĭk'nō-dŏnts* [Gr. *puknos*, dense; *odous* or *odonta*, a tooth]: in *geol.*, an extensive family of fossil fishes, having the mouth provided with a dense pavement of thick, round, and flat teeth.

PYCNOGONIDÆ, *pĭk-nō-gŏn'ĭ-dē*: very remarkable family of *Crustacea*, of section *Edentata* of Milne-Edwards, and forming the order *Aranciformes* (Spider-like) of some authors. By Cuvier and many other naturalists, a place was assigned them among *Arachnida*; and it is only of late that they have been decidedly referred to *Crustacea*, in consequence of the discovery that they undergo metamorphoses. They all are marine, and some live among algæ, or are found under stones on the beach,

while others are dredged from deep water. They seem to prey by suction on mollusks, but probably on many kinds of marine animals. The legs of many, as in the genus *Pycnogonum*, are furnished with hooks for taking hold; and Linnæus believed *P. littorale* to be parasitic on whales; but it is common among sea-weeds on British coasts. The suctorial proboscis of these creatures may be said to form the whole head. The abdomen is almost rudimentary. Their most remarkable characteristic is in their digestive cavity. The stomach gives off from its circumference ten long cæca, four of which on each side extend into the proper or locomotive legs, the other two into the pincer-like rudimentary foot-jaws. These ramifications of the alimentary canal seem to serve all purposes of the circulatory, respiratory, and chyliferous systems of higher animals. Hoek, in *Challenger Reports*, and Dohrn, in *Fauna u. Flora d. Golfes v. Neapel*, have thoroughly reinvestigated the structure and development of this remarkable group, and give systematic descriptions and figures of all the new and more important forms. For summary, see Huxley's *Comp. Anat. Invertebr. Anim.*, and Balfour's *Embryology*, I.

Pycnogonum littorale.

PYCNOSTYLE, n. *pĭk'nō-stīl* [Gr. *puknos*, dense or thick; *stūlos*, a column]: in *anc. arch.*, a colonnade in which the columns stand very close to each other: see INTERCOLUMNIATION.

PYE: see PIE 2.

PYELITIS, n. *pī'ĕ-lī'tĭs* [Gr. *pu'ĕlos*, a basin, a trough, and *itis*, a Greek terminal denoting inflammation]: inflammation of the pelvis or expanded open space of the kidney in which pus is formed, or in the ureter.

PYGARG, n. *pī'gärg* [Gr. *pūgargos*—*lit.*, white-rump, a species of antelope—from *pūgē*, the rump; *argos*, white]: the female of the hen-harrier; in *Scrip.*, a species of antelope.

PYGMALION, *pĭg-mā'lī-on*: legendary king of Cyprus; son of Cilix and grandson of Agenor. He hated all women, but he made in ivory the figure of a woman which was so beautiful that he fell in love with it, and prayed to Aphrodite (Venus) to endow it with life, which, according to the legend, she did. P. then married the living statue, and she became the mother of Paphus, who founded the city of that name.

PYGMY, or PIGMY, n. *pĭg'mĭ* [F. *pygmée*, a pygmy—from L. *pygmæi*; Gr. *pugmaioi*, a mythic dwarfish race of antiquity—from Gr. *pugmē*, the distance from the elbow to the knuckles : It. *pigmeo*]: one of a fabulous nation of dwarfs a cubit in height; a dwarfish person: in *zool.*, the chimpanzee: ADJ. very small in size. PYGMEAN, a. *pĭg-mē'ăn*, very small; dwarfish.—The *Pygmies* were a fabulous race of dwarfs in whose existence the ancients believed. Homer says that every spring they were attacked by the cranes on the coasts of Oceanus. Later writers place them at the mouths of the Nile, but we read also of northern pygmies inhabiting the region of Thule, and of pygmies who lived in subterranean dwellings on the e. side of the Ganges. Greek fancy worked hard to paint the Lilliputian dimensions of these creatures. It was said that they cut down every corn-ear with an axe; that when Hercules came into their country, they climbed up his goblet, by the help of ladders, to drink from it; and that when he was asleep, two whole pygmy armies fell on his right, and another on his left, hand, but all were rolled up by the hero in his lion's skin. Aristotle deemed the stories about pygmies not utterly fabulous, however overlaid by fancy with the marvellous. His interpretation was, that they were probably some diminutive tribe in Upper Egypt, who rode very small horses, and lived in caves.

THE AFRICAN PYGMIES are a race or races of small-sized men in interior Africa; discovered by Paul Du Chaillu (q.v.), who was the discoverer of the gorilla also. His accounts of them, and other striking features of his books, *Explorations and Adventures in Equatorial Africa* (1861), and *The Country of the Dwarfs* (1871), were questioned by geographers and scientists. He made his explorations 1855–65. During his Emin relief expedition, Henry M. Stanley (q.v.), who relates that he heard of the Watwa or Batwa dwarfs on his journey down the Congo 1876–7, travelled through the region inhabited by the dwarfs, and captured 59 of them. Du Chaillu's measurements of this people tally precisely with those made by Stanley, and the latter confirmed the dwarf-story of the earlier explorer. A region of about 30,000 sq. m. between the Ihuru and Ituri rivers abounds with these undersized nomads or pygmy wild people of the woods. Their hutted camps are invariably near the settlements of the larger agricultural aborigines. The P. measure, a few only 33 inches in height, and the tallest 4 ft., 4 in. There are two widely distinct types of P.: one of clear light bronze in color; the other much darker, almost black. The former type has an open look; eyes far apart, large, protuberant, and of brilliant, flashing, limpid black, reminding one of the eyes of gazelles; the skin on the face in youth has the sheen of old yellow ivory, while that on the body is of sober light brown. The other and darker type shows great prognathy of jaw, tapering at the chin almost to a point; their eyes are

deeply set and close together; the nasal bridge greatly sunk. They have narrow, retreating foreheads, and projecting lips; the skin of the body is rough, and the fell is very marked. Both types are distinguished for their small, delicate hands, taper fingers, and narrow, highly arched feet. Their villages, usually 2 to 3 m. from agricultural settlements, are in the form of a circle of low huts—one showing 92 in a circle about 50 yards in diameter, the tribal chief's hut at the centre. The huts are of tortoise-back shape, 7 to 10 ft. long, 4½ to 7 wide; rarely over 4½ high; doorways at each end, not over 3 ft. high.

PYHÄJÄRVI, LAKE: see FINLAND.

PYJAMAS, n. *pī-jâ'măz*, or better, PAJAMAS, *pă-jâ'mâz* [Hind., Mahratta, etc.]: loose wide trousers or drawers of some light fabric, supported by a cord drawn round the waist; worn in India by both sexes—and sometimes covering the feet entirely. As used in this country for men's night-costume, they are completed by the addition of a loose short jacket of the same material.

PYLE, HOWARD: 1853, Mar. 5———————: artist and author; b. Wilmington, Del. He studied art with private tutors in Philadelphia, and in 1876 removed to New York, where he soon became widely known as a writer and illustrator for books, magazines, and other periodicals. He was exceptionally successful as a writer of juvenile fiction. His publications include *The Merry Adventures of Robin Hood* (1883); *Pepper and Salt* and *Within the Capes* (1885); *The Wonder Clock* and *The Rose of Paradise* (1887); *Men of Iron* and *A Modern Aladdin* (1891); and *Twilight Land* (1894). He also edited *The Buccaneers and Marooners of America* (1891).

PYLON, n. *pī'lŏn* [Gr. *pulōn*, a gateway]: in *arch.*, the mass of buildings on either side of the entrance to an Egyptian temple.

PYLORIDEANS, n. plu. *pĭl-ŏ-rĭd'ē-ănz* [Gr. *pulōros*, a gate-keeper; *eidos*, likeness]: certain bivalves, including those having the shell nearly always equivalve and gaping at the two extremities.

PYLORUS, n. *pī-lō'rŭs* [Gr. *pulōros*, a gate-keeper—from *pulē*, a gate]: the lower and right-hand orifice of the stomach leading to the intestines. PYLORIC, a. *pī-lŏr'ĭk*, pert. to the pylorus.

PYM, *pĭm*, JOHN: famous as the leader of the popular party in the house of commons in the reign of Charles I: 1584–1643, Dec. 8; b. Brymore, Somerset; of a good family. He had considerable property in his native county. He was for some years a gentleman commoner of Pembroke College, Oxford; afterward studied law at one of the Inns of Court. Having been sent to parliament as member for Tavistock, Devonshire, he attached himself to the popular party; and, during the latter part of the reign of James I., became noted for his vigorous opposition to the arbitrary measures of the court. In 1626, the year after the accession of Charles

L., he distinguished himself by taking a prominent part in the impeachment of the king's favorite, the Duke of Buckingham. In 1640, the functions of parliament having been in abeyance for 13 years, during which time the popular discontent had gradually been growing to a head, the celebrated Long Parliament was convened; and from the first, P. was by common consent recognized in it as the leader of the opposition to the despotic policy of the monarch. For the position which he thus occupied, his qualifications were eminent. In temper he was bold and fearless; he was master of an eloquence close, terse, and vigorous; and in knowledge of parliamentary form and business procedure he was considered to have scarcely an equal in the house. 1640, Nov. 3, as soon as business had opened, he set forth to the house, in a long and elaborate address, the intolerable grievances under which the nation labored; and a week later, he boldly denounced the Earl of Strafford as the 'great promoter of tyranny,' to whose evil influence on the mind of the king these grievances were in the main to be attributed. In the impeachment of Strafford which followed, resulting in execution of the death sentence under a bill of attainder, Pym took the leading part. Of this master-stroke of policy, which deprived the king of the one man of resolute temper and powerful genius who adhered to his cause, the credit must be awarded chiefly to Pym. In the subsequent proceedings against Laud also, he was conspicuous, as in every other crisis of moment, till the time when war became inevitable between the king and the parliament. On the breaking out of hostilities, he remained at his post in London, and, in the exercise of the functions of the executive there, rendered services to the cause not less valuable and essential than those of a general in the field. While the strife was yet pending, he died somewhat suddenly at Derby House, having been appointed to the important post of lieut. of the ordnance only the month previous. He was buried in Westminster Abbey with great pomp, and was borne to his last resting-place by six members of the house of commons. The house of commons also voted £10,000 in payment of his debts.

PYNCHON, *pin'chon*, JOHN: statesman and soldier; 1627–1703; b. Essex, England; only son of William P., by whom he was brought to New England 1630. On his father's return to England 1652, he succeeded him in the government of Springfield, Mass., and in the direction of the Conn. valley affairs. He was the first col. of the Hampshire (co.) regt., and was in active service in the early French wars and in King Philip's war 1675; was councilor under the administrations of Dudley and Andros, and under the new charter of Mass. from 1693 until his death. He was in favor with the colonists, and with the Indians, with whom he negotiated several successful treaties. He died at Springfield.

PYNCHON, THOMAS RUGGLES, D.D., LL.D.: 1823, Jan. 19——————: educator; b. New Haven, Conn. He graduated at Trinity College, Hartford, 1841; was tutor 1843–47; ordained deacon in the Prot. Episc. Church 1848 and priest 1849; held charges in Stockbridge and Lenox Mass., 1849–55; became prof. of chemistry in Trinity College 1854; was pres. of the college 1874–83; and held a chair there 1895. He published many sermons and scientific papers, and received the degree of D.D. from St. Stephen's College 1865, and LL.D. from Columbia 1877.

PYN'CHON, WILLIAM: 1590–1662; b. Essex, England: colonist and author. He came to New England with Winthrop 1630, as one of the patentees of the colony of Mass. He settled first at Roxbury, which he helped to found; and 1636 at Agawam, now Springfield, of which he was one of the founders. In 1640 he received a commission to govern this colony, and in Apr. of that year the colonists changed the name from Agawam to Springfield, in honor of P.'s home in England. In 1650 he went to London and published his book, *The Meritorious Price of Christ's Redemption*. This work was considered heretical, and condemned to be burned; and the author was cited to appear before the general court, which he failed to do. Owing to the reception of his book, and his own bad treatment in the matter, he returned to England 1652, and settled at Wraysbury, on the Thames. In 1655 he published a revision of *Christ's Redemption*, and a reply to the Rev. John Norton, who had been appointed to answer the first edition. He was the author of a number of other theological works. He died at Wraysbury.

PYNE, *pīn*, LOUISA: popular English singer: b. 1832; dau. of a well-known singer, G. Pyne. She received instruction from Sir George Smart, and appeared in public in London 1842. She appeared in Paris 1847, made her *début* in opera 1849, and later visited America. She is known chiefly from her being chief soprano of an English opera company, in which she was associated with Mr. Harrison at the Lyceum, Drury Lane, and Covent Garden.

PYR-, *pīr-*, or PYRO-, *pīr'ō* [Gr. *pur*, fire; *pūros*, of fire]: a prefix signifying, literally or figuratively, 'fire;' in *chem.*, altered by heat, or obtained by the action of heat; in *geol.*, igneous.

PYRACANTH, n. *pīr'ă-kānth* [Gr. *pur*, fire; *akantha*, a spine]: evergreen thorn producing flame-colored berries. PYR'ACAN'THOUS, a. *-kăn'thŭs*, having yellow spines. PYRACANTHA (see CRATÆGUS).

PYRALLOLITE, n. *pīr-ăl'lō-līt* [Gr. *pur*, fire; *allos*, another; *lithos*, a stone: so called from the changes of color it undergoes before the blow-pipe]: a mineral found in Finland, of a greenish-white color, consisting principally of silicate of magnesium.

PYRAME, n. *pī-răm'* [F.]: a small water-spaniel.

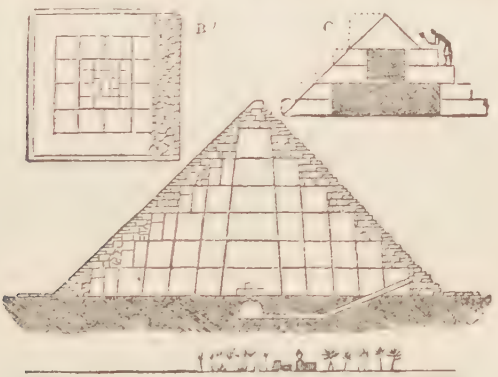
PYRAMID, n. *pĭr′ă-mĭd* [F. *pyramide*, a pyramid—from L. *pyr′amis* or *pyram′idem*; Gr. *pur′amis* or *puram′ida*, a pyramid—a word of Egyptian origin]: one of the great ancient structures of Egypt, supposed to be set apart for some sacred or religious use, perhaps as tombs; the base forming a square and facing the four cardinal points, the sides bounded by plane triangles ending at a common point at the vertex (see PYRAMIDS, THE). Pyramid, in *geom.*, is a solid figure, of which the base is a plane rectilinear figure, and the sides are triangles, converging to a point at the top or 'apex.' Pyramids, like prisms, are named from the form of their bases; thus, a P. having a triangle for its base is a triangular P., with a square base a square P., with any four-sided figure for its base a quadrangular P.; or it may be pentagonal, hexagonal, etc. Pyramids may be either 'right' or 'oblique.' See PRISM. A right P., with an equilateral figure for its base, has all its sloping edges equal; but this is not the case if the P. be oblique. The most remarkable property of the P. is that its volume is exactly one-third of that of a prism having the same base and vertical height; and it follows from this, that all pyramids having the same base and height are equal to each other. PYRAMIDAL, a. *pĭr-ăm′ĭ-dăl*, also PYRAMIDIC, a. *pĭr′ă-mĭd′ĭk*, and PYR′AMID′ICAL, a. *-ĭ-kăl*, having the form of a pyramid. PYRAM′IDALLY, ad. *-dăl-lĭ*, or PYRAMIDICALLY, ad. *pĭr′ă-mĭd′ĭ-kăl-lĭ*. PYRAMIDAL NUMBERS, numbers resulting from the successive sums of polygonal numbers. PYRAMIDOID, n. *pĭr-ăm′ĭ-doyd* [Gr. *eidos*, resemblance]: a figure resembling a pyramid; a solid formed by the rotation of a semiparabola about its base or greatest ordinate. PYRAMIDION, n. *pĭr′ă-mĭd′ĭ-ŏn*, in *arch.*, the small flat pyramid formed on the top of an obelisk. PYRAMIDES, n. plu. *pĭr-ăm′ĭ-dēz*, in *OE.*, pyramids. PYRAMIDS, n. plu. *-mĭdz*, a game played on an ordinary billiard-table, with fifteen red balls and one white ball. ANTERIOR PYRAMIDS, POSTERIOR PYRAMIDS, fibrous structures in the brain.

PYR′AMID LAKE: in Roop co., w. Nevada, near the Cal. boundary; about 33 m. long, 10 m. wide; 4,000 ft. above sea-level. The Truckee river empties into it, but it has no visible outlet.

PYR′AMIDS, THE: structures of the shape of the geometric figure so called, in various parts of the old and new world, the most important being the Pyramids of Egypt and of Mexico. Those of Egypt were considered one of the seven wonders of the ancient world, are 70 in number, of different sizes, are between 29° and 30° n. lat., and are masses of stone or brick, with square bases and triangular sides. Although various opinions have prevailed as to their use, as that they were erected for astronomical purposes, for resisting the encroachment of the sand of the desert, for granaries, reservoirs, or sepulchres, the last-mentioned hypothesis has been proved correct in recent times by the excavations of the

late Gen. Howard Vyse, who is said to have expended nearly £10,000 in investigating their object and structure. They all were the tombs of monarchs of Egypt who flourished from the fourth to the twelfth dynasty, none having been constructed later than that period; the subsequent kings being buried at Abydos, Thebes, and other places, in tombs of very different construction. The meaning of the word pyramid is involved in great obscurity; though attempts have been made to derive it from the Coptic *piharam*, yet, as in the hieroglyphs, it is found in connection with the words *ben ben* or *ber ber*, forms of the Coptic *berbe mahon*, or tomb, and *abmer*, or sepulchre, it is probably an ancient Greek word. The pyramids are solid mounds raised over the sepulchral chambers of the kings, the first act of an Egyptian monarch being to prepare his future 'eternal abode.' For this purpose, a shaft of the size of the intended sarcophagus was first hollowed in the rock at a suitable incline to lower it, and at a convenient depth a rectangular chamber was excavated in the solid rock. Over this chamber, a cubical mass of masonry, of square blocks, was then placed, leaving the orifice of the shaft open. Additions continued to be made to this cubical mass both in height and breadth as long as the monarch lived, so that at his death all that remained to be done was to face or smooth the exterior of the step-formed mound. But in some cases, the masonry passed beyond the orifice of the shaft, which involved the construction of a new shaft, having its orifice beyond it. The Pyramid was faced by adding courses of long blocks on each layer of the steps, and then cutting the whole to a flat or even surface, commencing from the summit. The outer masonry, however, or casing, as it is called, has in most instances been partially stripped off. Provision was made for protecting the vertical joints by placing each stone half-way over another. The masonry is admirably finished; and the mechanical means by which such immense masses of stone were raised to their places has long been a mystery; the discovery, however, of large circular holes in some of the stones has led to the conclusion that they were wound up by machines. The stones were quarried on the spot; sometimes, however, granite taken from the quarries of Syene was partially employed. The entrances were carefully filled up, and the passage protected by stone portcullises and other contrivances, to prevent ingress to the sepulchral chamber. There appears to have been also a door or pylon at the entrance of the shaft, ornamented with Egyptian sculptures and hieroglyphs. The sides of the pyramids face the cardinal points, and the entrances face the north. The work of the larger Pyramids was executed by corvées of laborers. The most remarkable and finest Pyramids are those of Gizeh, on a level space of the Libyan chain at Memphis, on the w. bank of the Nile. The three largest are the most famous,

The first or Great Pyramid, as appears from the excavations of Vyse, was the sepulchre of the Cheops of Herodotus, the Chembes, or Chemmis, of Diodorus, and the Suphis of Manetho and Eratosthenes. Its height was 480 ft. 9 inches, and its base 764 ft. sq. Its slope or angle was 51° 50′. It has been, however, much spoiled and stripped of its exterior blocks for the building of Cairo. The original sepulchral chamber, called the Subterranean Apartment, 46 ft. x 27 ft., and 11 ft. 6 inches high, has been hewn in the solid rock, and was reached by the original passage of 320 ft. long, which descended to it by an entrance at the foot of the Pyramid. The excavations in this direction were subsequently abandoned, on account of the vast size



Supposed Mode of Construction of Pyramids:
(From Gliddon's *Egyptian Archæology.*)

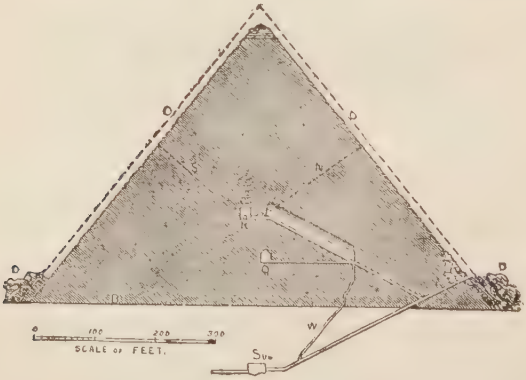
A, Section of a Pyramid; B, horizontal section of the base, rubble-work, and casing of a Pyramid; C, a view of a Pyramid, showing the process of finishing from the top downward.

attained by the Pyramid, which rendered it impracticable to carry on the entrance on a level with the natural rock, which had been cut down and faced for that purpose. Accordingly, a second chamber, with triangular roof, was constructed in the masonry of the pyramid, 17 ft. x 18 ft. 9 inches, and 20 ft. 3 inches high. This was reached by a passage rising at an inclination of 26° 18′, terminating in a horizontal passage. It is called the Queen's Chamber, and occupies a position nearly in the center of the Pyramid. The monument—probably owing to the long life attained by the monarch—still progressing, a third chamber, called the King's, was finally constructed, by prolonging the ascending passage of the Queen's Chamber 150 ft. further into the very center of the Pyramid, and after a short horizontal pas-

sage, making a room 17 ft. 1 inch x 34 ft. 3 inches, and 19 ft. 1 inch high. To diminish, however, the pressure of the superincumbent masonry on the flat roof, five small chambers were made vertically in succession above the roof, the last one pointed, varying in height from 1 ft. 4 inches to 8 ft. 7 inches, the apex of the top one being rather more than 69 ft. above the roof of the King's Chamber. The end of the horizontal passage was finished in a superior style, and cased with red syenitic granite; and in the King's Chamber was the granite sarcophagus of the king Cheops, 7 ft. 6½ inches long, 3 ft. 3 inches broad, and 3 ft. 5 inches high, for whom the Pyramid was built.

Piazzi Smyth thinks that this coffer was not a sarcophagus, but a standard measure of capacity, of which the British quarter is the fourth part (*Our Inheritance in the Great P.*, 1864). Proctor (in *The Great P.*, 1882) holds that the Pyramid was primarily an astrological observatory, and only secondarily a tomb. Without doubt it is carefully oriented, and most of its constructive details manifestly bear relation to astronomical facts.

As the heat of the King's Chamber was stifling, owing to lack of ventilation, two small air-channels, or chimneys, about nine inches square, were made, ascending to the n. and s. sides of the Pyramid. They perfectly ventilate this chamber. After the mummy was deposited



Section of Great Pyramid of Gizeh:

(From Vyse's *Pyramids of Gizeh.*)

D, débris and remains of casing; Q, queen's chamber; K, king's chamber; O, outer casing line; S, N, air channels; W, well; sub., subterranean apartment.

in the King's Chamber, the entrance was closed with granite portcullises, and a well made at the junction of the upward-inclined and horizontal passages, by which the workmen descended into the downward-inclined

passage. Subsequently there arose various traditions, even in the days of Herodotus, Cheops being reported to lie buried in a chamber surrounded by the waters of the Nile. Its construction required a long time—100,000 men being employed on it 30 years, or more probably more than half a century, the duration of the reign of Cheops, which is dated by different chronologists at B.C. 3229, 3095, or 2123. The operations in this Pyramid by Gen. Vyse gave rise to the discovery of marks scrawled in red ochre in a kind of cursive hieroglyphs on the blocks brought from the quarries of Tourah. These contained the name and titles of Khufu (hieroglyphic form of Cheops); numerals and directions for the position of materials: with them were masonic marks.

The second Pyramid is on a higher elevation than the first, and was built by Suphis II., or Kephren, who reigned 66 years, according to Manetho, and appears to have attained a great age. It has two sepulchral chambers, and appears to have been broken into by Caliph Alaziz Othman Ben-Yousouf A.D. 1196. Subsequently, it was opened by Belzoni. The masonry is inferior to the first, but it was anciently cased below with red granite.

The third Pyramid, built by Menkara, or Mycerinus, who reigned 63 years, is much smaller than the other two, being only 218 ft. high by 354 ft. 6 inches square. It also has two sepulchral chambers, both in the solid rock. The lower sepulchral chamber, which held a sarcophagus of rectangular shape, of whinstone, had a pointed roof, cut like an arch inside; but the cedar coffin, in shape of a mummy, had been removed to the upper or large apartment, and its contents there rifled. Among the débris of the coffin and in the chambers were found the legs and part of the trunk of a body with linen wrapper, supposed by some to be that of the monarch, but by others to be that of an Arab, on account of the anchylosed right knee. This body and fragments of the coffin were removed to the British Museum; but the stone sarcophagus was unfortunately lost off Carthagena, by the sinking of the vessel in which it was being transported to England. The masonry of this Pyramid is excellent, and it was anciently cased half-way up with black granite.

There are six other Pyramids of inferior size and interest at Gizeh; one at Abou Rouash, five m. n.w. of the same spot, is ruined, but of large dimensions; another at Zowyet El Arrian, also of limestone, is still more ruined; another at Reegah, in the vicinity of Abooseer, also much ruined, and built for the monarch User-en-Ra, by some supposed to be Busiris. There are five of these monuments at Abooseer, one with a name supposed to be that of a monarch of the third dynasty; and another with that of the king Sahura. A group of 11 Pyramids remains at Sakkara; the exploration of some of these 1881 by Maspero gave some very interesting results. Five other Pyramids are at Dashour, the

northernmost of which is supposed to be that of the king Asychis of Herodotus, and has a name of a king apparently about the 12th dynasty. Others are at Meydoon and Illahoon; and two at Biahmo, at Medinat El Fyoum, apparently the sepulchres of the last kings of the 12th dynasty. Some small brick Pyramids of the kings of the 11th dynasty are at the Drah Aboo Negger at Thebes. In Nubia, the anc. Æthiopia, are several Pyramids, tombs of the monarchs of Meroë, and of some of the Ethiopian conquerors of Egypt. They are taller in proportion to their base than the Egyptian Pyramids, and generally have a sepulchral hall, or propylon with sculptures, facing the east. The principal groups of these Pyramids are at Bege Rauie, or Begromi, 17° n. lat., in one of which, gold rings and other objects of late art, resembling that of the Ptolemaic period, were found.

In Assyria, the Birs Nimrud, or Tower of Belus, was a kind of step-shaped Pyramid of seven different-colored bricks, dedicated to the planets by Nebuchadnezzar. The Mujellibe, another mound, was of pyramidal shape. The Pyramid entered also into the architecture of the tomb of Sardanapalus at Tanus, and of the Mausoleum of Artemisia at Halicarnassus. A small Pyramid, sepulchre of C. Cestius, imitated from the Egyptian in the days of Augustus, still exists within the wall of Aurelian at Rome. Temples and other monuments of pyramidal shape are found in India, China, Java, the Polynesian Islands, and elsewhere. The Toltecs and Aztecs erected temples in Mexico, called *Teocalli*, or abodes of gods, of pyramidal shape, with steps or terraces by which to ascend and reach an altar, placed usually on the summit, where they performed human sacrifices and other rites. These, however, are not true Pyramids, the pure and simple form of which is restricted to Egypt. The Pyramid entered extensively into the architecture of the Egyptians, and appears on the tops of obelisks and tombs as a kind of roof. Small models of Pyramids, with inscribed adorations to the sun, or having royal names, also were placed in the tombs.—Lepsius, *Ueber den Bau der Pyramiden*, 1843; *Briefe*, 143, 217; Wilkinson, *Topogr. of Thebes* (Lond. 1835); Vyse, *Operations Carried on at Gizeh in* 1837 (1842); Gliddon, *Otia Ægyptiaca* (1849); Piazzi Smyth, *Life and Work at the Great Pyramid* (1867).

PYRAMUS, *pĭr'a-mŭs*, AND THISBE, *thĭz'be*: two lovers, whose tragical history is told by Ovid in the 4th book of his *Metamorphoses*. They were natives of Babylon, and tenderly attached to each other, but as their parents would not hear of their marriage, they had to content themselves with clandestine interviews by night. On one occasion they arranged to meet at the tomb of Ninus, where Thisbe, who was first at the trysting-spot, was startled to discover a lioness. She immediately ran off, but in her terror and haste, dropped her garment, which the fierce animal, that had just torn an ox in

pieces, covered with blood. Soon after, Pyramus appeared, and seeing his mistress's robe, came to the conclusion that she had been murdered, whereupon he killed himself. Thisbe now returned, and beholding her lover lying dead on the ground, put an end to her own life. The story was a favorite one during the middle ages, when lovers, unhappy in their love, were termed a *Pyramus and Thisbe*. Shakespeare, in *Midsummer Night's Dream*, introduced the story—but in a way that has the effect of caricature.

PYRARGYRITE, n. *pir-ar-jī-rīt* [Gr. *pur*, fire; *argyros*, silver]: a rich ore of silver of a dark-red color, consisting of a sulphide of that metal and antimony, widely diffused both in the old and new worlds.

PYRE, n. *pīr* [L. *pyra*, a funeral pile—from Gr. *pur*, fire]: a heap of combustible materials on which a dead body was laid to be burned to ashes.

PYRENA, n. *pī-rē'nà*, pl. PYRE'NÆ, *-nē* [Gr. *purēn*, the stone of fruit]: in *bot.*, stony coverings of the seeds in the medlar: the putamen. PYRENOUS, a. *pī-rē'nŭs*, full of fruit-stones.

PYRENEES, *pir-é-nēz'*: mountain range separating France from Spain; 270 m. long and 30 to 70 m. broad, extending from the Gulf of Rosas in the Mediterranean, to the s.e. corner of the Bay of Biscay. This mountain-system (estimated area 12,600 sq. m.) consists of two great chains, one extending e. from the Bidassoa to the w. bank of the Noguera Pallaresa; the other, originating in the Pic du Midi d'Ossau (9,510 ft.; lat. about 0° 25′ w., a little n. of the former, extends e., and after being intersected at the Val d'Aran by the Garonne and many smaller streams, reaches the Mediterranean, on whose shores, immediately n. of the Gulf of Rosas, it terminates in the promontories Norfeo and Creuz. The *northern* slopes of these mountains to the plains and undulating districts of s.w. France, are of gradual descent; while the southern slopes descend to the mountainous regions of n. Spain by steep terraces. That portion of this mountain-system in which the e. part of the southern, and the w. part of the northern chains are parallel, is called the High or Middle P.—a district about 16 m. in length, the wildest and most elevated portion of the whole system. In the s.w. of the Middle P. is a series of lofty summits, beginning with the Pic du Midi de Pau (9,544 ft.), and ending with the barren Maladetta, whose highest point, the Pic de Nethou or Malahite (11,168 ft.), is the summit of the system. Between these two peaks are several upward of 10,000 ft., e.g., Mont Perdu (10,994 ft.). The n.e. and less elevated portion of the Middle P. forms a rampart, frequently interrupted by transverse valleys, and whose principal summits are the Pic de Gavisos (8,170 ft.) and the Pic du Midi de Barèges (9,307 ft.). The Eastern P. lift their highest summits into the region of perpetual snow, and as far as the sources of the Segre, form a mighty unbroken wall of rock. From this point, how-

ever, they assume a different character, decreasing in height, and intersected by valleys. The West P. nowhere reach the snow-line, as their highest summit, the Pic d'Anie, does not rise above 7,500 ft. Forming at first ridges of 6,000 to 7,000 ft., they decrease in height as they extend w., until, on the Lower Bidassoa, they take the form of isolated masses about 3,000 ft. high. The average height of the P. is 6,000 to 7,210 ft. At almost equal elevation are most of the mountain-passes. These passes, called in some places *cols*, in others *ports* (Span. *puerto*), are about 100 in number, though only seven of them are practicable for wagons and cannon. The most important are the roads of St. Jean de Luz over the Bidassoa to Vittoria, St. Jean Pied du Port to Pampluna, and that from Perpignan over Junquera to Gerona. The P. comprise no extensive and long valleys. Generally, the valleys are small and caldron-shaped, and communicate through narrow passes. The rivers are inconsiderable. The region of perpetual snow, which, on the n. slopes of the mountains, begins at the height of 8,137 ft., and on the southern slopes at 8,858 ft., comprises no extensive snow or ice tracts. Glaciers are few and small, and do not occur below 7,800 ft. On the warm and dry s. slopes, no glaciers occur. Forests are few, and the steep walls of rock, parched by the sun and mid-day winds, are either quite bare, or covered with low brushwood and meagre pasture. The more gradually declining n. slopes, on which snow and springs are more abundant, show richer vegetation, and are mostly covered with lofty forests, and beautiful mountain pasture. Granite forms the kernel of the Pyrenean mountain-system, and is overlaid by chalk and sandstone masses. The P. are not rich in metals, but abound in mineral springs, of which the chief are those of Bagnères de Bigorre (q.v.) and Barèges.

PYRÉNÉES, Basses, *bās pē-rā-nā'*: department forming the s.w. corner of France; 2,943 sq. m. The dept. is divided into the five arrondissements Pau, Oloron, Orthez, Bayonne, and Mauléon; chief town Pau. The Basses-P. occupies the n. slopes of the w. Pyrenees, offshoots from which divide the dept. into a number of valleys, each traversed by a clear mountain stream, locally known as a *gave*. The chief of these are the Gave d'Oloron, Gave de Pau, the Bidouze, and Nivelle. The high valleys and slopes are generally fertile, and well adapted for growth of the vine, chestnut, various other fruits, and maize, though not for wheat. The best wines are those of Jurançon and Gau, Pontac and Auberlin. Flax and hemp, rye, barley, oats, and millet also are grown; but the principal source of industry, after making of wine, is rearing of horses, cattle, sheep, and mules for the Spanish markets, and raising of swine in the great beech-forests, together with preparation of hams of excellent quality and high flavor. Marble, alabaster, slate, ophite, copper, iron, sulphur, and cobalt are chief mineral products; but their importance as sources of wealth falls short of that of the numerous mineral springs, the most

important of which are those of Biarritz, Cambo, Eaux-Bonnes, and Eaux-Chaudes. Pop. (1891) 425,027.

PYRÉNÉES', Hautes. *hōt*: department of France, e. of the Basses-Pyrenees; 1,749 sq. m.; part of the old province of Gascony. The Hautes-P., which, as its name implies, contains the loftiest summits of the Pyrenean chain, is divided into the three arrondissements Tarbes, Argelès, and Bagnères: chief town Tarbes. The scenery is very varied—savage mountains and precipitous rocks in the s., an agreeable diversification of hill with dale in the centre, softening down to fertile plains in the north. The principal rivers, none however being navigable in the dept., are the Adour and the Gave de Pau. The climate is generally mild in the plains and sheltered valleys, but even there, storms are frequent. The well-cultivated and artificially watered low lands yield good crops of cereals, leguminous plants, flax, fruits of every kind, including the grape, from which excellent wine and brandy are made. Horses, mules, cattle, sheep, swine, and poultry, are reared. This dept.—the richest part of the Pyrenees in mineral products, especially marble of various kinds, copper, iron, zinc, lead, antimony, slate, granite, etc.—contains also the most celebrated springs, as the sulphur springs at St. Sauveur, and the hot-baths of Bagnères, Barèges, and Cauterets. The very limited commercial industry of Hautes-P. embraces manufacture of woolen and mixed fabrics, including bareges, coloring matters, leather, paper, cutlery, etc. There is a smuggling trade with Spain. Pop. 1881) 236,474, 1891) 225,861.

PYRÉNÉES-ORIENTALES, . *pē-rā-nā'zō-rē-ŏng-tăl'*: maritime dept. of France, bounded e. by the Mediterranean, s. by the Pyrenees; 1,590 sq. m. It is divided into three arrondissements, Perpignan, Prades, and Céret; chief town Perpignan. Like the Basses and Hautes Pyrénées, this dept. presents a series of parallel valleys formed by spurs from the Pyrenees; but in this case the valleys run e. and w; they are three in number, watered by the Gly, Tet (the principal river), and Tech. The s.w. corner is drained by the Segre (Segura), tributary of the Ebro. An extended plain occupies all the n. and e. of the dept. The climate is good, and in the plains extremes of heat or cold are rare. Vegetable products include fine grain and some of the choicest fruits of this latitude. Wines constitute the wealth of the district; and includ the red wines of Roussillon, the white muscatel of Rivesaltes, and other approved kinds. Chief exports are wine, cocoons, the surplus live stock and its products, and sardines anchovies, etc. The mineral wealth is not remarkable. Pop. (1891) 210,125.

PYRENEITE, n. *pĭr'ē-nē'īt* [from the *Pyrenees*]: a black or grayish-black variety of iron-lime garnet.

PYRENODEOUS, a. *pī-rēn'ō-dĭn* [Gr. *purēn*, the stone of fruit; *eidos*, resemblance]: resembling stone of fruit; globular; wart-like.

PYRETHRUM, n. *pīr-ēth'rŭms* [L. *pyreth'rum*, Spanish chamomile; Gr. *pur*, fire]: a genus of plants, ord. *Compositæ*, subord. *Corymbiferæ* —many are in cultivation as ornamental greenhouse or hardy plants; the pellitory of Spain, whose roots, hot to the taste, are used in medicine. PYRETHRUM PARTHENIUM. *pār-thēn'ĭ-ŭm* [Gr. *parthēnos*, a virgin]: common feverfew, aromatic and stimulant.

PYRETICS, n. plu. *pīr-ĕt'ĭks* [Gr. *pur'etos*, a fever—from *pur*, fire]: medicines for the cure of fever.

PYRETOLOGY, n. *pīr'ē-tol'ō-jĭ* [Gr. *pur'etos*, a fever; *logos*, discourse]: a treatise or discourse on fevers; the doctrine of fevers.

PYREXIA, n. *pīr-ĕksĭ-ă*, PYREX'IE, n. plu. *-ĭ-ē* [Gr. *pyressein*, to be in a fever—from *pur*, fire]: fever; the febrile condition; febrile diseases. PYREX'IAL, a. *ĭ-ăl*, or PYREX'ICAL, a. *-kăl*, of or pert. to fever; feverish.

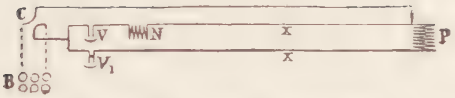
PYRHELIOMETER. *pīr-hē-lĭ-ŏm'ē-tĕr*, or PYROHELIOMETER, *pī-rō-hē-lĭ-ŏm'ē-tĕr* [Gr. *pur*, fire; *helios*, sun; *metron*, measure]: instrument invented by Pouillet for measuring the amount of heat radiated from the sun. It consists of a shallow cylindrical vessel filled with mercury or water, in which is plunged the bulb of a thermometer. The upper surface of the vessel, blackened to absorb as much heat as possible, is so attached to a support as to receive the sun's rays perpendicularly. The amount of heat actually absorbed is ascertained by ordinary calorimetric methods; the area of blackened surface exposed is known, as is also the amount of mercury or water raised a given no. of thermic degrees: from these elements is obtained the absolute heating effect of the sun on the given area.

PYRIDINE, n. *pīr'ĭ-dēn* [Gr. *pur*, fire]: a colorless pungent oil; an alkali produced in smoking tobacco.

PYRIDIUM, n. *pīr-ĭd'ĭ-ŭm* [L. *pyrum*, a pear]: in *bot.*, the same as *pome*.

PYRIFORM, a. *pīr'ĭ-fawrm* [L. *pyrum*, a pear; *forma*, shape]: pear-shaped.

PYRITES, n. *pī-rī'tēz* [Gr. *puritēs*, a stone from which fire may be struck—from *pur*, fire: L. *pyrītēs*, flint: L. *pyrite*]: in *mineralogy*, large group or *family* of minerals, compounds of metals with sulphur, or with arsenic, or with both: they are crystalline, hard, generally brittle, and generally yellow. PYRITIC, a. *pīr-ĭt'ĭk*, or PYRIT'ICAL, a. *-ĭ-kăl*, pert. to or resembling pyrites. PYRITIFEROUS, a. *pīr'ĭ-tĭf'ēr-ŭs* [L. *fero*, I produce]: containing or producing pyrites.—*Pyrites* was the name originally of the sulphuret of iron, known as IRON P.; and was given to it because of its striking fire with steel [Gr. *pur*, fire], so that it was used for kindling powder in the pans of muskets before gun-flints were introduced. Iron P. is commonly of bright brass-yellow color; it is often found crystallized in cubes, in which form small crystals of it are abundantly scattered in some roofing-slates; and



Siemens' Resistance **Pyrometer.**

Pyrheliometer.

Python Reticulatus. (India.)

Quippa.

very large ones occur in some of the mines of Cornwall; it is found crystallized also in dodecahedrons and other forms, more rarely in oblique four-sided prisms; and it often occurs massive, globular, stalactitic, capillary, or investing other minerals as an incrustation. Beautiful specimens of globular Iron P. are found in the chalk of England. It is a very widely diffused and plentiful mineral, seeming to belong almost equally to all geological formations. It is too abundant in many coal fields, the action of water and air changing it into sulphate of iron (vitriol), during which change so much heat is evolved that the coal is frequently kindled by it, mines become unworkable, and the progress of the fire can be stopped, if at all, only by building up portions of them to cut off access of air, or by admission of a plentiful supply of water. At Quarreltown, Renfrewshire, Scotland, a deep hollow is visible where, more than a century ago, the ground fell in, in consequence of a subterranean fire thus kindled. The color of Iron P. has caused it to be often mistaken for gold, a mistake which should be prevented by its hardness and comparative lightness, as also by its ready solubility in nitric acid, and its burning before the blowpipe on charcoal with bluish flame and smell of sulphur. But it sometimes does contain a small proportion of gold, sometimes even in visible grains: this auriferous Iron P. is found in Siberia and in S. America. Iron P. is never used as an ore of iron, but is much used for manufacture of sulphuric acid, and sulphur is obtained from it by sublimation. It is used also for the manufacture of alum.—A variety of Iron P. of very pale color is called *Marcasite*. There is also a magnetic variety.—COPPER P., called also *Yellow Copper* and *Chalcopyrite*, is the most abundant of all ores of copper, and yields a large proportion (perhaps a third) of the copper used in the world. It is brass-yellow, the color varying with the amount of copper, a rich color indicating much copper, and a pale color a comparatively large amount of iron; for this ore is a sulphuret not of copper, but of copper and iron. It occurs massive and scattered in rocks of almost every class; and is often found crystallized in octahedrons and tetrahedrons, but generally in very small crystals. It may be distinguished at once from Iron P. by its comparative softness, yielding readily to the knife, and by the green color of its solution in nitric acid. Before the blowpipe, with borax and soda, it yields a bead of copper.—COBALT P., or *Cobaltine*, a sulphuret and arsenjuret of copper, is a principal ore of cobalt: it is generally of silver-white color, and occurs massive, scattered, or crystallized in cubes, octahedrons, dodecahedrons, and polyhedrons, in primitive rocks.—NICKEL P., called also *Copper Nickel* and *Nickeline*, used as an ore of nickel is a compound of nickel and arsenic: it is generally found massive, and is of copper-red color.

PYRITZ, *pĕ′rĭts*: very ancient town of Prussian Pomerania, govt. of Stettin, 25 m. s.e. of the town of Stettin. There are standing five high towers on the town-walls, built by the Wends, under whom it was a place of great strength. There is a seminary named after Otto, Bp. of Bamberg, near the spring where it is said he, 1124, baptized the first Pomeranian converts. P. has manufactures of woolen cloth and leather. Pop. (1880) 8,123; (1885) 8,062.

PYR′MONT: see WALDECK-PYRMONT.

PYRO: see PYR.

PYRO-ACETIC SPIRIT, n. *pĭr′ō-ă-sĕt′ĭk* [*pyro*, and *acetic spirit*]: a limpid ethereal liquid obtained by the dry distillation of the acetates.

PYRO-ACIDS, n. *pĭr′ō-ăs′ĭds* [*pyro*, and *acid*]: products obtained by subjecting certain organic acids to heat, as PYR′OCIT′RIC, PYR′OLIG′NEOUS, PYR′OMAL′IC, PYR′OGAL′LIC, etc.

PYROGALLATE, n. *pĭr′ō-găl′lāt* [*pyro*, and *gallic*]: a salt of *pyrogallic acid*. PYROGALLIC ACID, an acid obtained by the action of heat on *gallic acid*.

PYROGENOUS, a. *pĭ-rŏj′ĕ-nŭs* [Gr. *pur*, fire; *gennaō*, I produce]: produced by the agency of fire; igneous.

PYROGRAPHY, n. *pĭ-rŏg′rā-fĭ* [Gr. *pur*, fire; *graphō*, I write]: method of producing ornaments or pictorial effects, by pressure of heated metallic cylinders or plates bearing dies or matrices in relief. PYROGRAVURE, *pī-rō-grā-vūr′* [F. *gravure*, graving]: process for engraving on wood, ivory, and other materials, with a red-hot point which chars the lines. Pyrogravure is the invention of Manuel Périer, of Paris, who has exhibited paper-knives, umbrella-handles, panels, and other objects decorated with figures thus produced. The graver consists of a pencil having a hollow curved point or beak of platinum, which is kept white-hot by a supply of mingled air and vapor of a hydrocarbon, as alcohol, wood-spirit, or benzine. It has long been known that such mixture, if warmed in a platinum tube, will combine with evolution of heat sufficient to bring the metal to incandescence: the effect had already been utilized by Pacquelin in performing the actual cautery. The Pyrogravure apparatus consists of a holder in which the hydrocarbon is mixed with air, and flexible tubes which convey the mixture to the graver. The invention promises to be useful in the production of printing-blocks, as also for decorative purposes.

PYROLA AND PYROLACEÆ: see WINTER GREEN.

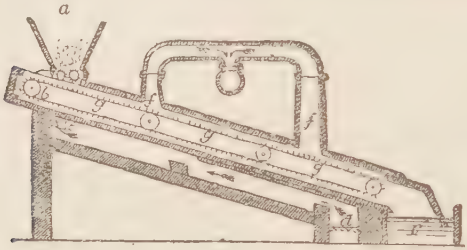
PYROLATRY, n. *pĭr-ŏl′ă-trĭ* [Gr. *pur*, fire; *latreia*, worship]: fire-worship.

PYROLIGNEOUS, a. *pīr'ō-lĭg'nē-ŭs*, or PYR'OLIG'NOUS, a. *-nŭs* [Gr. *pur*, fire; *púros* of fire; L. *lignum*, wood]: [illegible] from the distillation of wood, usually beech, birch, or boxwood. PYROLIGNEOUS SPIRIT, [illegible] *pyroxylic spirit*. PYR'OLIGNITE, n. *-nīt*, a salt of pyroligneous acid. PYROLIGNEOUS ACID, or *wood vinegar*, crude commercial form of Acetic Acid (q.v.). It is made by destructive distillation of wood; and contains, besides acetic acid, tar and other products, which have to be removed if it is required in a pure state. Often it is obtained from oak branches, which, after being stripped of their bark, are too small for timber purposes. These are cut into short billets, which are placed in cast-iron retorts, and a sufficient [illegible] to drive off the volatile constituents and carbonize the wood. The best woods for the distiller are 'hard' woods, though all will yield it; as is seen from the following table, which partly summarizes the experiments of Stolze:

	100 Parts of Dried Wood give	
	Crude Pyroligneous Acid.	Pure Hydrated Acetic Acid.
Birch (*Betula alba*),	45·0	4·47
Beech (*Fagus sylvatica*),	44·0	4·29
Oak (*Quercus robur*),	43·0	3·88
Ash (*Fraxinus excelsior*),	46·8	3·72
White Poplar (*Populus alba*),	45·8	3·23
Bird Cherry (*Prunus padus*),	47·3	2·92
Juniper (*Juniperus communis*),	45·8	2·34
Spruce Fir (*Pinus abies*),	41·2	2·16
Scotch Fir (*Pinus sylvestris*),	42·4	2·14

[illegible] is always found much more productive [illegible] and the acid is also freer from impurities: for the [illegible], the thicker and darker is the tarry matter. Hence two separate plans have been [illegible] by residents of Manchester, England, in which [illegible], chips, [illegible], and spent dye-woods are used. In Halliday's plan, the retort is a long tube, with the fire acting along its entire length; inside is an Archimedean screw, worked by machinery, which passes the sawdust or other material slowly from the commencement to the end, where, by a particular contrivance, it falls out in the state of thoroughly carbonized wood. It is supplied by means of a hopper. The volatile matters pass up an outlet-pipe in the upper part of the tubular retort. In Bowers's plan, the principle is similar, though differently carried out, as seen in the illustration: *a* is the hopper through which the sawdust is fed; and it is always kept well supplied, so that, by the pressure of the supply, the escape of vapor may be prevented; *gg* is an endless chain worked over the four rollers by a small steam-engine, and carrying the materials from the hopper by means of projections on the chain along the lower side of the retort, so as to bring them in contact with the furnace *d*, which, after passing along in the direction of the arrow, has its flue at *e*. By the time the material reaches the bottom, all the vola-

tile matters have been vaporized, and have passed up into the condenser at *ff*, and the carbonized material falls into a cistern of water at *c*, into which the open end of the retort dips, the water closing it sufficiently. One of these retorts will yield about 200 gallons per day of pyroligneous acid. This acid is of great use in the arts, especially in making the acetates used by dyers



and calico printers; and it is also, when very carefully purified and properly diluted with water, used extensively as a substitute for common vinegar in pickling, and even for table use.

PYROLOGY, n. *pīr-ŏl′ŏ-jĭ* [Gr. *pur*, fire; *logos*, discourse]: a treatise on heat; the science of heat. PYROL′OGIST, n. *-jĭst*, one versed in the doctrines of heat.

PYROLUSITE, n. *pīr′ō-lō′sīt* [Gr. *pur*, fire; *louein*, to wash, in allusion to its extensive use in glass manufactories to remove color from common glass]: in *min.*, a term for the black oxide of manganese—a substance very rich in oxygen, and much employed in chem. and the arts, of an iron-black or steel-gray color.

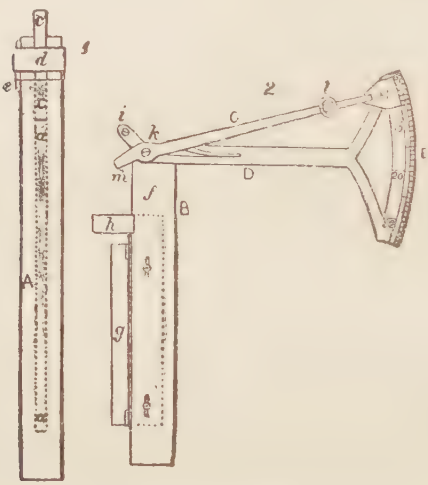
PYROMANCY, *pīr′ō-măn′sĭ* [Gr. *pur*, fire; *manteia*, divination]: divination by fire (see DIVINATION). PYR′OMAN′TIC, a. *-tĭk*, pert. to pyromancy: N. one who pretends to skill in divination by fire.

PYROMANIA, n. *pīr′ō-mā′nĭ-ă* [Gr. *pur*, fire; *mania*, madness]: insane desire to burn everything. PYR′OMA′NIAC, n. *-mā′ni-ak*, one possessed of this desire.—*Pyromania* is an involuntary, motiveless tendency to destroy by means of fire. The blind instinct to burn is manifested sometimes in children before reason or a knowledge of property can actuate them, and with no other object than mischievous destructiveness, or to enjoy the blaze of a conflagration. In a large number of the cases, where legal investigation has disclosed the mental condition of the incendiary, and where the motive could not be determined, or was obscure or inadequate, the perpetrators were young girls at about the period of puberty. The most remarkable example in modern times of this morbid tendency appearing epidemically was in Normandy 1830, where barns, granaries, and vineyards over a large tract of country were consumed, and where

the incendiaries were exclusively girls. When apprehended in numbers, they confessed that, though prompted by *internal sensations*, they had no other explicable purpose than to see the light. But this is the pure and typical form of the propensity: in general, insane incendiarism is the result of, or is complicated with, some obvious incentive. Jonathan Martin, being insane, but impelled by superstition, set fire to York Minster, 1829; and passions and delusions of every character, personal and political antipathies, and the spirit of agrarian outrage, may seek gratification in this kind of desolation. Like other outbursts of misery, it has been observed to accompany famines, pestilences, and great social convulsions.—Prichard on Insan. 243: Marc. *De la Folie*, II. 305.

PYROMETER, n. *pir-om'-e-tur* [Gr. *pur*, fire; *metron*, a measure]: in *chem.*, an instrument for measuring very high degrees of temperature; a contrivance for ascertaining the temperature of the hottest bodies. PYROM'ETRY, n. *-i-tri*, the art of measuring degrees of heat, or the expansion of bodies by heat. PYROMETRIC, a. *pir-o-met'rik*, or PYROMET'RICAL, a. *-ri-kal*, pert. to the pyrometer or its use. PYROMETRICALLY, ad. *-li.*—*Pyrometer* was originally the term applied by Muschenbroek 1731, to an instrument which he invented for measuring the changes produced in the dimensions of solid bodies by application of heat. It is now applied to any instrument whose object is to measure all gradations of temperature above those that can be indicated by the mercurial Thermometer (q.v.). Desaguliers gives a description of Muschenbroek's instrument, as improved by himself, in *Experimental Philosophy*. Numerous pyrometers have since been invented, among which are those of Ellicott (described in *The Philosophical Transactions*, 1736 and 51), Graham (in the same, 1754), Wedgwood (in the same, 1782, 84, and 86), and Guyton (in *Annales de Chimie*, XLVI.). None of these instruments, however, gave accurate results for very high temperatures; and it was not till 1821 that Prof. Daniell announced the invention of his P., which soon supplanted all others, and for which, in improved form, he received the Rumford Medal from the Royal Soc. It consists of two distinct parts, the *register* (1) and the *scale* (2). The register is a solid bar of black-lead earthenware, A, eight inches long, cut out out of a common black-lead crucible. In the axis of this, a hole is drilled, reaching from one end of the bar to within half an inch of the other extremity; and in this cylindrical cavity a bar, *aa*, of metal (e.g., platinum or iron) is placed. A cylindrical piece of porcelain, *cc*, sufficiently long to project a short distance beyond the extremity of the black-lead bar, is placed on top of the metallic bar: this is termed the index, and it is kept firmly in its position by a ring or strap of platinum, *d*, which is tightened by a wedge of porcelain, *e*. When the register is exposed to a high temperature, the expansion of the metallic rod, *aa*, forces the index for-

ward; and when the register has afterward cooled, the tension of the strap will retain the index at the farthest point to which it has been protruded. The scale (2) consists of a frame composed of two rectangular plates of brass, *f*, *g*, joined together by their edges at a right angle, and fitting square upon two sides of the register. Near the end of this frame is a small brass plate, *h*, which projects at a right angle. To the extremity of



Daniell's Pyrometer.

the frame nearest the brass plate is attached a movable arm, D, turning round a fixed centre, *i*, and at its free end carrying the arc of a circle, E, the radius of which is five inches, and which is accurately graduated into degrees and thirds of a degree. Upon this arm, at the centre, *k*, another lighter arm, C, is made to turn, carrying at its longer part a Vernier (q.v.), H, which moves on the face of the arc, and divides it into minutes, together with an eye-glass, *l*, to assist the reading; while the shorter part terminates in a knife-edge *m*, turned inward at a right angle.

To use this P., the scale is carefully applied, the brass plate, *h*, being pressed on the shoulder of the register, and the lighter arm being so placed that the steel point, *m*, may rest on the top of the index in a notch cut for it which coincides with the axis of the rod. The position of the index being then read off on the scale, the register is detached and exposed to the heat to be measured; after it is removed and cooled, it is placed again in the scale, and the new position of the index read off; the difference of the two readings determining the expansion of the metallic bar above that of the black-lead.

Wedgwood's P. is based on the contraction of baked clay: those of Pouillet, Regnault, and Daily, on the expansion of air: Becquerel's on the strength of thermo-electric currents produced by heating the junction of two metals; that of Siemens (one of the best) on the electrical resistance of a coil of wire; and König's on the expansion of the wave-length of a definite sound. For Ericsson's Solar Pyrometer, see *Nature*, XXX; and for Pyrometry and its bibliography, see Poggendorf's *Annalen*, XXIX.

PYROMORPHITE, n. *pir'ō-mor'fīt* [Gr. *pur*, fire; *morphē*, shape]: a native phosphate of lead, a mineral of a green, yellow, or grey colour. PYROMORPHOUS, a. *-fus*, that assumes a crystalline form by means of fire.

PYRONOMICS, n. *pir-on-om'iks* [Gr. *pur*, fire; *nomos*, a law]: the science of heat.

PYROPE, n. *pir'ōp* [L. *pyropus*, gold bronze: Gr. *purōpos*, fire-eyed—from *pur*, fire: *ōps* or *ōpa*, the face] beautiful and much-prized gem, often called *Carbuncle* and *Hyacinth* by lapidaries. It is nearly allied to garnet. It is composed of silicic acid, alumina, magnesia, lime, and the protoxides of iron, chromium, and manganese. It is always of deep red colour, and is transparent, or at least translucent, with the appearance of burning coal when held between the eye and the sun. It occurs usually in round-ish grains, but rarely in imperfectly crystalline rocks. It is found chiefly in Saxony and Bohemia; also at Elie ('Elie Rubies') in Fife, Scotland.

PYROPHANE, n. *pir'ō-fān* [Gr. *pur*, fire; *phainō*, show]: a mineral becoming transparent by heat. PYROPHANOUS, a. *pir-of'a-nus*, rendered transparent by heat.

PYROPHONE, n. *pir'ō-fōn*, called also *flame organ*: musical instrument invented by Kastner of Paris, in which the musical tones are produced by flames of hydrogen gas burning in tubes of different sizes and lengths, arranged somewhat as in an ordinary organ.

PYROPHORUS, n. *pir-of'ō-rus* [Gr. *pur*, fire; *phoros*, bearing]: any substance inflaming spontaneously on exposure to the air, or taking fire from the rapidity with which it is oxidized. If iron, cobalt, or nickel be reduced by hydrogen from its oxide at a low red heat, it is obtained in a state of such extreme division as to become incandescent by the mere oxidizing action of the atmosphere; and the tendency to rapid oxidation is much increased by interposition of some infusible matter, as a little alumina or magnesia, between the particles of the oxide. This is due probably to the cohesion of the minute particles of the reduced metal being thus mechanically prevented, and the access of air to the surface of each particle being thus facilitated. If tartrate of lead be heated in a tube till the organic portion becomes charred, the metallic lead is reduced to a state of extreme subdivision, and usually takes fire when poured into the air. If finely-powdered sulphate of

potash be mixed with half its weight of lamp black, and heated in a covered crucible, the sulphate is reduced to sulphide of potassium, which remains in a finely-divided state, mixed with the excess of carbon, and takes fire spontaneously in the air from the rapid absorption of oxygen. These are among the best examples of pyrophori. PYROPH'OROUS, a. *-ō-rŭs*, pert. to or resembling pyrophorus.

PYROPHYSALITE, n. *pīr'ō-fīs'ă-līt* [Gr. *pur*, fire; *phusal'lis*, a bubble—from *phūsaō*, I blow—in allusion to the manner in which it swells up when heated]: a coarse and nearly opaque variety of topaz.

PYROSCOPE, n. *pīr'ō-skōp* [Gr. *pur*, fire; *skopeō*, I view]: an instrument for measuring the pulsatory motion of the air, or the intensity of radiating heat.

PYROSIS, n. *pī-rō'sis*, or WATERBRASH [Gr. *purōsis*, a burning—from *pur*, fire]: one of the modifications of dyspepsia, or indigestion; characterized by a burning sensation at the pit of the stomach, followed by eructation of a considerable quantity of thin, watery fluid, generally tasteless but sometimes sour, and often described by the patient as being cold. It occurs in paroxysms, usually in the morning or forenoon, when the stomach is empty. The first symptom of it is a pain at the pit of the stomach, and a sense of constriction, as if the stomach were drawn toward the back. The pain is often very severe, and after continuing some time it brings on the discharge of the fluid, after which the pain lessens, and gradually disappears. When the attack has once occurred, it is usually repeated at intervals for a considerable time. It is often accompanied with other symptoms of dyspepsia, and is sometimes associated with organic disease of the stomach, or of the liver. It seems due largely to indigestible diet, and too free use of spirits. When no organic disease is present, the affection usually disappears under well-regulated diet, with administration of opium, combined with astringents (as in the Compound Kino Powder), care being taken to guard against the constipating effect of these drugs by use of a mild aperient daily, e.g., a little confection of senna, or three grains of the Compound Colocynth Pill, combined with two grains of Extract of Hyoscyamus. If this treatment fail, nitrate of bismuth, or oxide of silver in appropriate doses, may be tried. In some cases a cure has been effected by the use of lime-water and milk.

PYROSMALITE, n. *pīr-ŏz'mă-līt* [Gr. *pur*, fire; *osmē*, odor; *lithos*, a stone—in allusion to the smell of chlorine given off when heated]: a mineral of a liver-brown color, a Swedish ore of iron.

PYROSOMIDÆ, *pī-rō-sŏm'i-dē*: family of Ascidians, forming the order *Dactylobranchiata* of Owen. They are marine, and swim freely in the water, many individuals usually combined like a number of thimbles fitted together, forming a mass of definite arrangement, nearly cylindrical, hollow, closed at one end, open at the other.

The individuals which form this group or mass have each a gill-sac with two gills, and inhale water by an orifice on the outer surface of the cylinder, expelling it by another orifice on the inner surface; and by the action of the stream of water which thus constantly flows from the open end of the cylinder, the whole mass is slowly propelled through the water with the closed end foremost. The P. are plentiful in warm seas. *Pyrosoma Atlanticum* is usually three to seven inches long. The P. are brightly luminous.

PYROTECHNIC, a. *pīr'ō-tĕk'nĭk*, or PYR'OTECH'NOAL, a. *-nĭ-kăl* [F. *pyrotechnique*, pyrotechnic—from Gr. *pyr*, fire; *technē*, art]: pert. to fireworks, or the art of making them. PYROTECHNICS, n. plu. *-nĭks*, or PYR'OTECH'NY, n. *-tĕk'nĭ*, the art of making fireworks (see below); the science which relates to the management and application of fire in its various operations. PYR'OTECHNIST, n. one who is skilled in the application and management of fire, or in the manufacture of fireworks.

PYROTECHNY, *pī'rō-tĕk'nĭ*: art of making fireworks. It is of unknown antiquity. It was practised among the Chinese from earliest times, and has attained with them a perfection unknown in other countries, so that they regard as indigenous the most brilliant American and European displays. In their fireworks they introduce many surprises, such as figures of men and animals darting about; but they are somewhat deficient in the mechanical arrangements. Fireworks, as the name is now understood, were hardly known in Europe until the discovery of the composition of gunpowder, and for a long time only very simple pyrotechnic contrivances were used. At present they may be divided into two kinds—simple hand-pieces, such as squibs, crackers, rockets, etc.; and the fixed contrivances which have often very ingenious mechanical arrangements for making some of their parts revolve rapidly when being discharged. The materials used are gunpowder, sulphur, charcoal, saltpetre, filings of steel, iron, copper, etc., and several salts, such as nitrate of strontian, acetate of copper, common salt, etc. The ingredients of fireworks are usually filled into paper cases, made by rolling pasted paper round a cylinder of wood of the proper diameter, until the case is of sufficient thickness, and then cutting the paper tube so formed into the required lengths for squibs, Roman candles, small rockets, and similar articles, seldom exceeding ten inches in length: one end of each is closed by drawing a piece of string tightly round, so as to pinch it in, or *choke* it as it is technically called, and then dipping it into melted resin, which effectually seals it (*a*, figs. 1, 2 and 3).

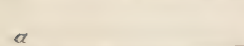
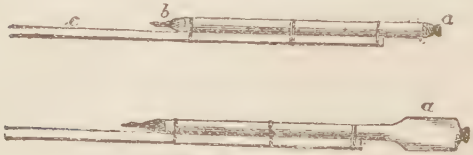


Fig. 1.

The combustible ingredients are filled in at the open end, and, if necessary, are rammed down with a wooden ramrod; the opening is

afterward covered with a piece of touch-paper, to prevent the composition falling out, and to ignite it by (*b*, figs 1, 2, and 3). The effects produced by fireworks are either streams of fire issuing straight out of the cases, and much varied with sparks in the form of stars, etc., and colored with brilliant colors; or wheels of beautiful sparks produced by making the cases revolve rapidly. Revolving pieces are made by coiling the paper tube, when not too tightly filled, around a flat wooden centre (*c*, fig. 2); the force with which the combustion of the materials is carried on is sufficient through impulse on the atmosphere to make the board revolve with great rapidity. Small wheels of this kind are called *Catharine-wheels* (fig. 2). *Squibs* or *serpents* are made by filling tubes, eight to ten inches in length (fig. 1), with a composition of 1 lb. of nitre, 2 oz. of charcoal powder (rather coarse), 4 oz. of gunpowder, 4 oz. of sulphur, and 6 oz. of steel filings. The last is an important ingredient in many fireworks, producing brilliant, feather-like corusecations, which are the more beautiful the larger and cleaner the filings are. *Rockets* are tied to a wooden stick (*c*, fig. 3). When they are

Fig. 2.



Figs. 3 and 4.

about to be discharged, this stick is stuck in the ground or is supported vertically on the ground, and in that position the igniting point of the rocket, *b*, is downward; when lighted, it rushes into the air with great velocity, and reaches a considerable height, discharging as it goes a brilliant stream of sparks. Rockets require a hollow centre all down the tube; without this they will not rise. At the end of their course, they often discharge brilliant clusters of golden, ruby, emerald, sapphire-like stars, or showers of golden or colored rain, or of fiery serpents. This is produced by a supplementary part, called the *garniture* of the rocket, consisting of a shorter and broader paper tube called the *pot*, attached to the end of the fusee part of the rocket (as in fig. 4, *a*), and filled with a composition made into a paste with pure alcohol, and cut into stars, or granulated into small round bodies for drops. The serpents for rockets are small fusees, with the same composition as squibs; they are so packed in as to ignite all at once. The white stars are made of

nitre, 16 parts; sulphur, 8 parts; gunpowder, 3 or 4 parts; nitrate of strontian added, makes them ruby red; sulphate of copper, and sulphate and carbonate of barytes, green; zinc filings give blue color. *Yellow stars and yellow showers* are made of nitre, 16 parts, 10 of sulphur, 4 of charcoal, 16 of gunpowder, and 2 of lampblack. A deeper and richer golden color is produced by a very slight variation in the composition—viz., 2 parts less of sulphur and charcoal, and 4 additional of gunpowder. Many other ingenious devices are used in this art. The *Roman candle* is a favorite firework; it is a tube [illegible] or more, pierced, and discharging upward a continuous stream of blue or white stars or balls. *Bengal lights* are cases about an inch or more in diameter, filled with a composition of 7 parts nitre, 2 of sulphur, and 1 of antimony. These are much used as signals at sea: they diffuse an immense glare of bluish-white light. *Chinese fire for*, used alone or in combination with other mixtures, consists of 16 parts of gunpowder, 8 of nitre, 3 of fine powdered charcoal, 3 of sulphur, and 10 of small cast-iron borings; the last must be finer or coarser in proportion to the bore of the case to be filled. The compound devices in fixed fireworks, such as are seen at public entertainments, are very complicated in their structure, and are varied more or less by every artist. One nice point in the arrangement is to insure simultaneous ignition of all the various parts.

PYROXENE, n. *pir-ŏks'ēn* [Gr. *pur*, fire; *puros*, of fire; *xenos*, a guest]: mineral of various shades of green gray, and black, sometimes colorless; another name for *augite*, in allusion to its usual mode of occurrence in the igneous rocks (see AUGITE). PYROXEN'IC, a. *-ĕn'ik* composed of or containing pyroxene.

PYROXYLIC SPIRIT, n. *pir'ŏks-il'ik*, or WOOD-SPIRIT, or METHYLIC ALCOHOL [Gr. *pur*, fire, *puros*, of fire; *xulon*, wood]: one of the products of the destructive distillation of wood; wood-naphtha; a peculiar alcohol obtained by destructive distillation of wood in manufacture of Pyroligneous Acid (q.v.). It is one of numerous volatile products of that distillation, and has to be separated from the others by saturating it with the chloride of calcium, with which it combines, and is no longer volatile, except at a temperature above 212° F. It is therefore easily separated by means of a steam-bath from its more volatile associates, which are carried off at a temperature below boiling water. A higher temperature is afterward applied to the residue, which is the compound of chloride of calcium and pyroxylic spirit, and the spirit is thus distilled off. Commercially, the discovery of this substance was of great importance, as many of its properties are the same as those of common alcohol. It is of nearly equal value to alcohol in making varnishes, as it dissolves the resins, oils, and similar substances. It has a peculiar naphtha-like odor, inseparable from it, which has prevented its use as a potable spirit; but it is as-

serted that it is now made almost odorless, and that it is taking the place of common alcohol in manufacture of cheap perfumes. PYROXYLIN, or PYROXYLINE, n. *pĭr-ŏks'i-lin*, or PYROX'YLE, n. *-il*, in *chem.*, Gun-cotton (q.v.); any explosive substance obtained by steeping a vegetable fibre in nitric and nitro-sulphuric acid, and afterward carefully washing it in pure water and drying it.

PYR'RHA: see DEUCALION.

PYRRHIC DANCE, n. *pir-rik dăns*: military war-dance in great favor with the early Greeks: ADJ. pert. to the dance; applied to a poetic foot containing two short syllables.—The *Pyrrhic dance*, most famous of all the war-dances of antiquity, is said to have been named from one Pyrrichos, or, according to others, from Pyrrhus or Neoptolemus, son of Achilles. Critical scholars, however, content themselves with a general inference from the substantial harmony of the various mythical or legendary accounts of its origin—viz., that it was a Doric invention. It was danced to the flute, and its

Pyrrhic Dance.
(Copied from Sir W. Hamilton's work on *Greek and Roman Vases.*)

time was both quick and light, as is seen from the Pyrrhic foot, composed of two shorts (⏑⏑), and the Prokeleusmatic, or challenging-foot, of two double shorts (⏑⏑ ⏑⏑). According to Plato, it aimed to represent the nimble motions of a warrior either avoiding missiles and blows, or assaulting the enemy; and in the Doric states, it was as much a piece of military training as an amusement. Elsewhere, in Greece, it was purely a mimetic

dance in which the parts were represented sometimes by women. It formed part of the public entertainments at the Panathenaic festivals. Julius Cæsar introduced it at Rome, where it became a great favorite. The *Romaika*, still danced in Greece, is said to be a modern relic of the ancient Pyrrhic dance; but if the accounts of recent travellers in the Hellenic kingdom are to be trusted, the resemblance is not evident.

PYRRHO, *pir'ō* (Gr. PYRRHON, *pir'on*: founder of a school of Greek skepticism named after him: b. Elis, in the first half of B.C. 4th c.; died about the age of 90. In his youth he is said to have been a painter, but was subsequently attracted to philosophy by study of the writings of Democritus. Diogenes Laertius tells us that, with Anaxarchus (one of his teachers, according to Aristocles), he joined Alexander the Great's eastern expedition; and it has been conjectured that, at this period, he obtained some knowledge of the opinions and beliefs of the Persian Magi and the Indian Gymnosophists. He spent a great part of his life in retirement. P.'s skepticism was not of the thorough-going kind usually associated with his name, which is synonymous with absolute and unlimited disbelief. He certainly disbelieved in the possibility of acquiring a scientific knowledge of things, but (like Kant) he appears to have tenaciously maintained the reality of virtue and the obligations of morality. So greatly was he reverenced by his townsmen for his personal excellences, and so little did they consider his philosophical skepticism a barrier to his holding a religious office, that they chose him high-priest of their sacred city, and for his sake declared all philosophers exempt from public taxes. Cicero (not entirely without reason) ranks him among the Socratics; indeed, he was as much opposed to the pretensions of the sophists as Socrates himself, though from a different point of view. P., so far as we know, wrote nothing; and the works of his friend and follower, Timon, are lost.

PYRRHONISM, n. *pir'rō-nizm*: tenets of the philosopher *Pyrrho*, who taught universal skepticism; skepticism; universal doubt. PYRRHONIC, a. *pir-ron'ik*, pert. to the tenets of Pyrrho. PYRRHONIST, n. *pir'rō-nist*, a follower of Pyrrho; a skeptic.

PYRRHOTINE, n. *pir'rō-tin* [Gr. *purrhotēs*, redness—from *pur*, fire]: a sulphide of iron of a reddish or light bronze-yellow color, inferior in hardness to common *iron pyrites*; magnetic iron pyrites.

PYRRHUS, *pir'us*. King of Epirus: about B.C. 318–272 (reigned B.C. 295–272); son of Æacides, and connected with the royal family of Macedonia through Olympias, mother of Alexander the Great, whose career of far-stretching conquest he dared to dream of imitating. P. was a Greek warrior whose personal bravery and passion for adventurous exploits almost equals anything recorded of the knights of chivalry. After many vicissitudes of fortune in his youth, he became

sole king of Epirus B.C. 295; and, in the following year, increased his territories by addition of the w. parts of Macedonia, which he obtained in reward for aiding Alexander, son of Cassander, against his brother Antipater, in their struggle for the paternal inheritance. B.C. 281 a glorious prospect opened before the eyes of the restless warrior—nothing less than the conquest of Rome and the western world, which (if he should achieve it) would confer on him a renown equal to that of his Macedonian kinsman. The Tarentines, a Greek colony in lower Italy, then at war with the Romans, sent an embassy to P., in the name of all the Greek colonies in Italy, offering him the command of all their troops against their enemies. The king was overjoyed at the proposal; instantly accepted it; and in the beginning of B.C. 280 sailed for Tarentum with 20,000 foot, 3,000 horse, 2,000 archers, 500 slingers, and a number of elephants. The gay, pleasure-loving Tarentines had no great relish for the rigorous service of war, and were far from pleased at the strict measures taken by P. to inure them to its hardships. The first battle between P. and the Romans (who were commanded by the consul, M. Valerius Lævinus) took place at the river Siris in Lucania. The contest was long, obstinate, and bloody; and P. succeeded only by bringing forward his elephants, whose strange appearance and gigantic size excited a sudden panic among the Romans. It was a hard-bought victory for P., who said, as he looked upon the field, thick-strewn with his numerous dead 'Another such victory, and I must return to Epirus alone.' Many of the Italian nations now joined P. (for Rome was not liked by her neighbors and dependants), and he proceeded on his march toward central Italy. The Roman senate was thoroughly frightened, and would have come to terms with P., but for the stirring speech of old Ap. Claudius Cæcus, which made them resolve to 'fight it out' with the foreigner. P., after penetrating to within 20 m. of Rome, found it impossible to proceed further with safety, as one Roman army occupied the city, and another hung upon his flanks and rear. He therefore withdrew to Campania, thence to Tarentum, where he wintered. The campaign of B.C. 279 was carried on in Apulia, and the principal engagement took place near Asculum. The Romans were again defeated; but P. himself lost so heavily that he felt it impossible to follow up his victory; and again withdrew to Tarentum. Here a truce was entered into between the belligerents; and P. passed over into Sicily to assist the Sicilian Greeks against the Carthaginians, B.C. 278. His first exploits in that island were brilliant and successful; but the repulse which he sustained in his attack on Lilybæum broke the spell which invested his name. Soon afterward he became involved in misunderstandings with the Greeks; and B.C. 276 he quitted the island in disgust, to renew his war with Rome. While crossing over to the mainland the Carthaginians

attacked him, and destroyed 70 of his ships, and though he reached Tarentum in safety, his prospects were now much more clouded than at first. B. C. 274 he fought a great battle with the Romans under the Consul Curius Dentatus, near Beneventum, and was utterly defeated, escaping to Tarentum with only a few personal attendants. He then saw himself forced to abandon Italy and return to Epirus, where he almost immediately engaged in war with Antigonus Gonatas, son of Demetrius, and king of Macedonia. His success was complete, for the Macedonian troops deserted to him *en masse*, and he once more obtained possession of the country; but nothing could satisfy his love of fighting, and in less than a year he was induced to enter on a war with the Spartans. He marched a large force into the Peloponnesus, and tried to take their city, but was repulsed in all his attempts. He then proceeded against Argos, where in a fight by night in the street he was killed by a woman who hurled a heavy roof-tile on his head.

PYRUS, *pī'rŭs:* genus of trees and shrubs of natural order *Rosaceæ*, sub-order *Pomeæ*, having 5-celled fruit, with a cartilaginous endocarp and two seeds in each cell. It includes species differing very much in appearance, in foliage, and in almost everything except the characters of the flower and fruit, and formerly constituting the genera *Sorbus*, *Aria*, *Aronia*, etc.; or included in *Mespilus* (Hawthorn) and *Cratægus*. Some botanists [illegible] Apple (*Malus*) as a distinct genus. Among the species of P. are some of the most valuable fruits of temperate climates, and some [illegible] ornamental trees and shrubs. See APPLE : PEAR : SERVICE : ROWAN. BEAM-TREE.

PYRUVIC, *pī-roō'vik* [Gr. *pur*, fire; L. *ūvā*, a grape] in *chem.*, applied to an acid obtained from the wine-grape; also from the destructive distillation of the racemic and tartaric acids.

PYTHAGORAS, *pī-thăg'o-ras*: ancient Greek philosopher of high celebrity: date of birth uncertain, but usually conjectured between B.C. 586 and 569, most probably B.C. 582; date of death conjectured B.C. 504; b. in the island of Samos, son of Mnesarchus, a merchant, or according to other accounts a signet-engraver. All authorities agree in fixing the period of his philosophical activity in the times of Polycrates and Tarquinius Superbus (B.C. 540–510). The life of this celebrated man, founder of the Italic School of Philosophy, has been greatly obscured by the mass of legends and incredible stories which gathered in later ages round his name. He is said to have been a disciple of Pherecydes of Syros, of Thales, and Anaximander; and, like other illustrious Greeks, to have undertaken extensive travels for the purpose of adding to his knowledge; in the course of which—lasting, we are told, nearly 30 years—he visited Egypt (bringing with him according to the usual story, letters of introduction from Polycrates to Amasis the king), and the more important countries of Asia, including even India. We have every reason to believe that he did, at all events, visit Egypt, and there availed himself of all such mysterious lore as the priests could be induced to impart; from whom possibly he learned the doctrine of Metempsychosis, or the transmigration of souls (which became one of the most famous tenets of the Pythagorean school), and whose influence may perhaps be traced in the mystic rites, asceticism, and peculiarities of diet and clothing which formed some of the chief Pythagorean characteristics—though it is nearly certain that his philosophic and religious system was much less indebted to the influence of other countries than the ancients generally believed. During his travels, we may believe, P. matured the plans which he afterward carried into action; but finding, on return to his native island, that the tyranny established there by Polycrates unfitted it for his abode, he quitted Samos, and eventually settled in the city of Croton, in s. Italy. Here he is said to have acquired in a short time unbounded influence over the inhabitants, as well as over those of the neighboring states; and here he established the famous Pythagorean fraternity or order, which has often been compared with the more celebrated order founded by Ignatius Loyola in modern times. The adherents of P. were chiefly among the noble and the wealthy; these, to the number of 300, he formed into a select society, bound by a sort of vow to himself and to each other, for the purpose of studying the philosophical system of their master, and cultivating the ascetic observances and religious rites enjoined by him. They thus formed at once a philosophical school and a religious brotherhood, which gradually assumed the character and exercised the power of a political association also. This political influence, which undoubtedly became very great, was constantly exerted on the side of aristocracy; and to carry out the principles of this

form of government, understood in the best sense of the word, seems to have the ultimate aim of Pythagoras. He is said also to have increased his influence by a practice unknown to the other sages of the ancient world—the admission of women, not probably into his society, but to a certain extent to his lectures and teachings. Of the internal arrangement and discipline of this fraternity we know little. All accounts agree that what was done and taught among the members was kept a profound secret from the outer world. In the admission of members, P. is said to have exercised the greatest care, and to have relied much on his skill in physiognomy. They then had, it is said, to pass through a long period of probation, in order to prove by such means as were essentially their powers of endurance and self-control—chiefly probably the assertion that they had to maintain silence for two or even five years as an expression of later times. Among the members of the society we are told there were several gradations, and there was also a more external division of disciples under the names *Exoterici* and *Esoterici*, the former being a term which was sometimes admitted to the more external doctrines and sublimer teaching of their master, the latter to those who received only the instruction open to all. The mode of life seems to have been regulated by P. in the minutest details. It is well known that he is said to have forbidden his disciples to eat beans, perhaps because of the deadly effects which they produce on some persons, perhaps because (but this is more doubtful) he regarded them as sacred, and there is no doubt that temperance of all kinds was strictly enjoined. In the course of instruction great attention was paid to mathematics, music and astronomy; and gymnastics formed an important part of the training. Religious teaching was inculcated in the so-called Pythagorean Verses, *Carmina Aurea*, which may be confidently ascribed to the second century before Christ. There is reason to believe that in general he taught a purer faith. The credit of the whole system seems to have been an authorised property on the part of the disciples, for their master left behind him the well-known *ipse dixit* as sufficient attestation; in the members of the order an elevated tone of character, exhibited in sincerity of mind and self-possession, extreme attachment to each other, and supreme contempt for all the outer world. For it was natural that political power uniformly exercised in one direction by an aristocratic and exclusive society such as this would in the end give to wide-spread jealousy and hatred, which at length, when opportunity was given, caused the overthrow of the fraternity. A war between the cities of Croton and Sybaris, in which the Pythagoreans took prominent part, ended in the total destruction of Sybaris B.C. 510; and on this success they seem to have presumed so greatly, that they proceeded to more active measures against the popular party than they had yet attempted. A violent outbreak was the

consequence; the house in which the leading Pythagoreans were assembled was set on fire, and many perished in the flames. Similar commotions ensued in other cities of s. Italy in which Pythagorean clubs had been formed, and the result was that, as a political organization, the Pythagorean order was everywhere suppressed; though, as a philosophical sect, it continued to exist many years after. Of the fate of P. himself different accounts are given; but he is generally supposed to have escaped to Metapontum, and died there, where his tomb was shown in the time of Cicero.

P. is said to have been the first to assume the title *Philosopher* ('Lover of wisdom') in place of the name *Sophos* ('Wise'), by which the sages had before been known. Various discoveries in music, astronomy, and mathematics are attributed to him; among others, the proposition now known as the 47th of Euclid, Book I. There is good ground for believing that he was a man of much learning and great intellectual powers, which were specially exerted in mathematical research, as is evinced by the general tendency of the speculations of his school. There is no doubt that he maintained the doctrine of the transmigration of souls into the bodies of men and other animals—which seems to have been regarded in the Pythagorean system as a process of purification—and he is said to have asserted that he had a distinct recollection of having himself previously passed through other stages of existence. We are told that on seeing a dog beaten, and hearing him howl, he bade the striker desist, saying, 'It is the soul of a friend of mine, whom I recognize by his voice.'

Respecting the system of philosophy actually taught by P. we have but little trustworthy testimony. P. himself, it is almost certain, wrote nothing, and the same seems to have been the case with his immediate successors; we therefore, in endeavoring to form an idea of the Pythagorean philosophy, must rely almost entirely on the compilations of later writers (mainly Diogenes Laërtius, and the Neo-Platonists, Porphyrius and Iamblichus, all of them long subsequent to the Christian era), who often understood but imperfectly the details that they gave. The tendency of the school was 'toward the consideration of abstractions as the only true materials of science' (Lewes's *Biographical History of Philosophy*), and to *Number* was allotted the most prominent place in their system. They taught that in Number only is absolute certainty to be found; that Number is the Essence of all things; that things are only a copy of Numbers; nay, that in some mysterious way, Numbers are things themselves. This Number theory was worked out probably from the fundamental conception, that, after destroying or disarranging every other attribute of matter, there still remains the attribute Number; we still can predicate that the thing is *one*. With this doctrine of Number was intimately connected that of the *Finite* and the *Infinite*, corresponding respectively with the *Odd* and the

Even in Number; and from a combination of this Finite and Infinite it was taught that all things in the Universe result. The abstract principle of all perfection was *One* and the *Good*, of imperfection, the *Many* and the *Infinite*. Essentially based also on the same doctrine, was the Theory of Music; the System of the Universe, which was conceived as a *Kosmos*, or one harmonious whole, consisting of ten heavenly bodies revolving round a Central Fire, the *Hearth* or *Altar* of the Universe; and the celebrated doctrine of the Harmony of the Spheres—the music produced, it was supposed, by the movement of these heavenly bodies, which were arranged at intervals according with the laws of harmony—forming thus a sublime Musical Scale. The Soul of Man was believed to partake of the nature of the Central Fire, possessing three elements, Reason, Intelligence, and Passion; the first distinctive of Man, the last two common to Man and Brutes.

The Ethical teaching of the Pythagoreans was pure and spiritual: Virtue was regarded as a harmony of the soul, a conformity with, or approximation to, the Deity; Self-restraint, Sincerity, and Purity of Heart were especially commended; and Consistentiousness and Uprightness in the affairs of life seem to have been their distinguishing characteristics.

The Pythagorean system was carried on by a succession of disciples till about B.C. 300, when it seems to have gradually died out, being superseded by other systems of philosophy; it was revived about two centuries later, and lasted for a considerable time after the Christian era—disfigured by admixture of other doctrines, and an exaggeration of the mystical and ascetic practices, without the scientific culture of the earlier school.

In addition to the writers above mentioned, scattered and scanty notices—affording, however, really the most trustworthy information that we possess, as to the life and doctrines of P.—occur in Herodotus, Plato, Aristotle (the latter especially), and a few other authors. For fuller details on the subject, see the Histories of Greece by Thirlwall and Grote, the works of Ritter, Brandis, Tennemann, Erdmann, Ueberweg, and Lewes, on the *History of Philosophy*; Zeller's *Philosophie der Griechen*, and Ferrier's lectures on the same subject; and Smith's *Dictionary*.

PYTHAGOREAN, a. *pī-thăg'ō-rē'ăn*, or PYTHAGORIC, a. *pĭth-ă-gŏr'ĭk*, or PY'THAGOR'ICAL, a. *-i-kăl*: pert. to *Pythagoras*, or to his philosophy. PYTHAGO'REAN, n. a follower of Pythagoras in doctrines or practice. PYTHAGORISM, n. *-rizm*, the doctrines or teachings of Pythagoras, an anc. Greek philosopher who taught that the solution of the principal philosophical problems is to be sought for in the study of mathematical relations, that the sun is a movable sphere in the centre of the universe; Pythagoras is also popularly esteemed the author of the doctrine of the transmigration of souls through different

orders of animal existence. PYTHAGOREAN LETTER, *n.* the letter Y, so called because Pythagoras employed it to signify the bifurcation of the good and evil ways of men. PYTHAGOREAN-LYRE, *n.* musical instrument said to have been invented by Pythagoras.

PYTHEAS, *pith'ē-as:* ancient Greek navigator: b. Massilia, in Gaul, prob. between B.C. 350 and 200. Though few of his writings are extant, it is known that he made various discoveries and that from him the Greeks of his time obtained most, if not all, of their definite knowledge of the w. portion of Europe. Although his statements were not universally accepted, they were credited by some of the most accomplished men of the day, and many of them were fully verified by later discoveries. He visited Britain and made extensive explorations, probably heard of but did not visit a region to the n. which he named Thule, and proceeded e. as far as the mouth of the Elbe. It is thought by some that he made two voyages, and reached points much farther n. and e. than are indicated above. It is certain that he was well versed in the astronomy of his time, that he determined the latitude of his native place with great accuracy, and that far better than most men of his day he understood the cause of the tides. A few fragments of his writings were published at Upsala (1824), and at Darmstadt (1835).

PYTH'IA: see PYTHONESS; DELPHI.

PYTHIAN GAMES: one of the four great national festivals of the anc. Greeks, held in the Crissæan plain near Delphi; said (according to the prevalent mythological legend) to have been instituted by Apollo after vanquishing the snaky monster, Python, and certainly in earliest times celebrated in his honor every ninth year. They were under the management at first of the Delphians, but about B.C. 590–586 the Amphictyons were intrusted with the conduct of them, and arranged that they should be held every fifth year. Some writers state that it was only *after* this date that they were called Pythian. Originally, the contests were restricted to singing, with accompaniment of cithern-playing, but the Amphictyons added the flute, athletic contests, and horse-raising. By and by, contests in tragedy, and other kinds of poetry, in historical recitations, and in works of art, were introduced, and long continued a distinguishing feature of these games, which are believed to have lasted till nearly the end of the 4th c. after Christ. The prize was a laurel wreath and the symbolic palm-branch. Several of Pindar's extant odes relate to victors in the Pythian Games.

PYTH'IAS: see DAMON AND PYTHIAS.

PYTHIAS, *pith'ias*. KNIGHTS OF: secret benevolent order established in Washington, D. C., 1864, Jan. 19, by Justus Henry Rathbone, for dissemination of the principles of friendship, charity, and benevolence. It has three degrees or ranks, page, esquire, and knight; transacts all business in the degree of knight; and since its establishment has organized two additional ranks for work outside its regular course, the uniformed rank and the endowment rank. The uniformed rank is a semi-military branch with an attractive uniform; and the endowment rank is a mutual life insurance branch. The establishment of these additional ranks greatly popularized the order, whose growth for several years had been slow. The order is world-wide in the scope of its activities, and for administrative purposes has a supreme lodge of the world; 48 grand lodges in states and territories, lodges in Manitoba, Northwest Ter., Okla., and the Sandwich Islands under the immediate jurisdiction of the supreme lodge of the world; and subordinate or local lodges. The membership of lodges 1894 was 443,615, of which O. had the largest number, 50,045; with Penn. second, 47,543; Ill. third, 34,870; Ind. fourth, 33,460; Ia. fifth, 21,704; N. Y. sixth, 21,601, and Mo. seventh, 19,625. The uniformed rank had 13,066 members, and the endowment rank 24,684, representing an aggregate endowment of $74,068,000.

PYTHON, *pī'thon*: genus of serpents of family *Boidæ* (see BOA), differing from the true boas in having the plates on the under surface of the tail double. On each side of the anus, claws project, connected with some internal bones representing the posterior limbs of most vertebrates; these claws give additional hold to the prehensile tail. The tip of the muzzle is plated; the

Python, or Rock Snake (*Hortulia Natalensis*).

lips are grooved. The species all are natives of the old world. They all are large; some of them very large, and rivalled in size by no serpents except the boas of America. The name Boa is often popularly given to the pythons, and in its ancient use belongs to them. Some of the pythons are known in the E. Indies by the

name of ROCK SNAKE, as *P. molurus*, a species very extensively diffused. This name is given to some species which belong to the genus or sub-genus *Hortulia*, one of which, the NATAL ROCK SNAKE (*H. Natalensis*), is said to attain so large a size that its body is as thick as that of a man. Although a native of Natal, it is already unknown in the settled parts of the colony. *Python reticulatus* is probably the largest snake of India and Ceylon. It is found also in more eastern regions. What size it attains is not well known. Specimens of 15 or 20 ft. long are frequent, but it certainly attains a much larger size. It seems to be this snake which is sometimes called ANACONDA. It is rather brilliantly colored; its body being covered with gold and black, finely intermixed. The forehead is marked by a longitudinal brown stripe. Although sluggish for some time after a repast, it is at other times very active, and easily scales the highest garden walls. It feeds on deer and smaller animals; but the largest pythons are said to seize buffaloes, tigers, and even elephants, and to crush them in their coils. In this there is perhaps some exaggeration: but there are well-authenticated stories of serpents in the E. Indies capable of killing the buffalo and the tiger. The Rock Snake of Java is not a *Hortulia*, but one of the two species of true Python.

PYTHONESS, n. *pī'thŏn-ĕs* [Gr. *pa'thōn*, the serpent or dragon which Apollo slew, whence he received the name of *Pythios*; *Pūthō*, anc. name of Delphi]: the priestess of Apollo at his temple at Delphi, in anc. Greece, who gave oracular answers; any woman supposed to have a spirit of divination. PY'THIAN, a. *-i-ăn*, pert. to the Pythoness. PYTHIAN GAMES (see above). PYTHON, n. *pī'thŏn*, in *anc. Gr. myth.*, the serpent or dragon slain by Apollo: genus of large serpents nearly allied to the boa (see above). PYTHONIC, a. *pī-thŏn'ĭk*, pretending to prophecy; prophetic. PYTHONIST, n. *pī'thō-nĭst*, a conjurer; a soothsayer. PY'THONISM, n. *-nĭzm*, the art of foretelling future events, after the manner of the anc. Delphic oracle.

PYX, or PIX, n. *pĭks* [Gr. *puxis*, a box, properly of boxwood: L. *pyxis*]: in the *Rom. Cath. Chh.*, the shrine or depository for the Host or consecrated wafer (see above): in *nav.*, the box in which the nautical compass is suspended: the box in which certain selected coins are set aside to be tested previous to the coinage being issued from the mint (see PYX, TRIAL OF THE).

PYX, or **PIX**: sacred vessel used in the Rom. Cath. Church to contain the consecrated eucharistic elements which are preserved after consecration, whether for the communion of the sick or for the adoration of the faithful in the churches. Its form has varied very much at different times. Anciently it was sometimes of the form of a dove, suspended over the altar. More commonly, however, it was, as its name implies, a simple box, generally of gold or silver, or, at least, of metal plated with gold or silver. At present, the pyx is commonly cup-shaped, with a close-fitting cover of the same material. The interior is ordered to be of gold, or at least gilded with gold. Like all sacred utensils connected with the administration of the eucharist, it must be blessed by a bishop, or a priest delegated by a bishop.

Pyx, Ashmolean Museum, Oxford.

(*Glossary.*)

PYX. The, or an official and periodical examination of [illegible] the coinage of metals, so named from the box in which a number of coins are kept pending examination. In the United States the trial is made of the [illegible] must be [illegible]: Wednesday in Feb. annually, by a committee comprising the judge of the U. S. District Court for the e. dist. of Penn., the comptroller of the currency, the director of the mint office in New York, and several citizens appointed by the president. Specimen coins from each mint or assay office are sent to the one in Philadelphia to be examined with the local coinage. The committee may call for any number of coins other than the selected ones. The examination is for the purpose of ascertaining if the coins are within the legal limits of tolerance in fineness and weight, the tolerance being a definite percentage allowed for loss in weight by abrasion, etc. The director of the mint superintends the examination of both of the coined pieces and, if called for, bars of bullion that are ready for coinage. A deviation beyond the limits of tolerance is immediately reported to the president, and may subject the mint officers to dismissal. The coins of the United Kingdom are subjected to the same trial now annually before a jury of goldsmiths presided over by the queen's remembrancer, but formerly about once in three years before a similar jury summoned and sworn by the lord chancellor.

PYXIDICULUM, n. *pĭk-sĭd-ĭk'ŭ-lum* [L. *pyxidĭc'ula*, a small box—from *pyxis*, a box]: a genus of diatoms whose minute siliceous shields present the appearance of a saucer-shaped box.

PYXIDIUM, n. *pĭk-sĭd'ĭ-um*, or PYXIS, n. *pĭk'sĭs* [Gr. *puxis*, a box: L. *pyxis*]: in *bot.*, a fruit dividing into an upper and lower half, the former acting as a kind of lid.

Q

Q, or q, *kū*: 17th letter of the English, Latin, and other western alphabets; a consonant, identical in power with the letter K (q.v.). It is always followed by *u*.

QUÂ, *conj. kwā* [L.]: as; in the character of; in that; because, as 'he did so not *quâ* he was a priest, but *quâ* he was a nominee of the state.'

QUAB, n. *kwŏb* [Dan. *quab*, an eel-pout: Ger. *quappe*, a tadpole]: in *Oil.*, an unfledged bird: anything in an imperfect or unfinished state; a flattish or softish fish, or fish-like creature.

QUA'BIRD, or QUAWK: see NIGHT-HERON.

QUA'CHA: see QUAGGA.

QUA'CHI: see COATI.

QUACK, n. *kwak* [an imitative word: the anc. Gr comic poet Aristophanes represents the croaking of a frog by *kōax kōax*: L. *cōaxo*, I croak: Ger. *quaken*, to croak like a frog: Dut. *kwaken*, to croak (see also QUACK 2)]: the cry of a duck: V. to cry like a duck. QUACK'ING, imp.: N. the act of uttering sounds as a duck. QUACKED, pp. *kwăkt*.

QUACK, n. *kwak* [Dut. *kwak*, a jest or story: Low Ger. *quackeln*, to talk much and idly, to work unskilfully: Dan. *quakle*, to dabble in, to bungle: a particular use of QUACK 1]: an ignorant pretender to medicine; a boastful pretender to skill or knowledge not possessed; a vendor of nostrums; an empiric: ADJ. falsely pretending or declared to cure diseases; pert. to or tainted with quackery: V. to act or practice as a quack. QUACK'ING, imp.: N. loud, senseless talk. QUACKED, pp. *kwakt*. QUACKERY, n. *kwăkĕr-i*, or QUACK'ISM, n. *-izm*, ignorant pretensions to skill in medicine; false pretensions to any art. QUACK'ISH, a. *-ish*, boasting of skill not possessed. QUACK'SALVER, n. *-sal-vĕr* [Ger. *quacksalber* from *quack*, and *salber*, one who deals in salves: Dut. *kwaksalver*]: one who boasts of skill in medicines and salves; an ignorant pretender.—SYN. of 'quack, n.': empiric; mountebank; charlatan.

QUAD, n. *kwŏd* [a corruption of *quadrangle*, which see]: in *Oxford*, a court of a college.

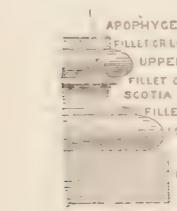
QUAD, n. *kwŏd*: in *print.*, an abbreviation of quadrat.

QUADER-SANDSTONE, n. *kwā'dĕr-sand-stōn* [Ger. freestone, square-stone]: in *geol.*, a siliceous sandstone of Cretaceous age, with many fossil shells identical with those of the English Chalk. It is sometimes 600 ft.

thick, and, being jointed and often precipitous, has much to do with producing the picturesque aspect of Saxon Switzerland.

QUADR-, *kwŏd′r*, or QUADRA-, *kwŏd′rā*, QUADRI-, *kwŏd′rĭ*, and QUADRU-, *kwŏd′rū* [L. *quat′ŭōr*, four]: common prefixes in scientific words, signifying 'four; containing 'four parts.'

QUADRA, n. *kwŏd′rā* [L. *quadra*, a square]: in *arch.*, a square frame or border round a bas-relief, panel, etc.; the square piece used to support the pedestal of statues, vases, etc. QUADRÆ, n. plu. *kwŏd′rē*, the bands or fillets of the Ionic base between which the hollow occurs.



Quadra.

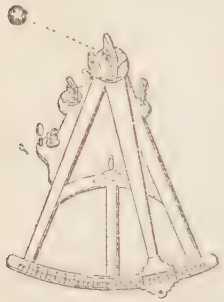
QUADRAGENE, n. *kwŏd′rā-jēn* [L. *quadrāgēni*, forty each]: in the *Rom. Cath. Chh.*, an indulgence of forty days.

QUADRAGESIMA, n. *kwŏd′rā-jĕs′ĭ-mā* [L. *quadragesĭmus*, fortieth; *quadraginta*, forty—from *quatuor*, four]: I. *Eccl.* because it consists of 40 days. It is more properly the name of the first Sunday in Lent. QUAD′RAGES′IMAL, a. *-ĭ-măl*, pert. to Lent; Lenten; used in Lent. QUADRAGESIMA SUNDAY, the first Sunday in Lent, being 40, or about 40, days before Easter: it is so named by analogy with the three Sundays which precede Lent, and which are called respectively Septuagesima, 70th; Sexagesima, 60th; and Quinquagesima, 50th.

QUADRANGLE, n. *kwŏd′răng-gl* [F. *quadrangle*, quadrangle — from L. *quadrangŭlus*, four-cornered — from *quatuor*, four, and *angulus*, a corner or angle: It. *quadrangolo*, a quadrangle]: in *geom.*, a plane figure having four angles and sides: in *arch.*, a four-cornered space inclosed by buildings; the rectangular courtyard of a large public building, as of a college. QUADRAN′GULAR, a. *-gū-lĕr*, having the form of a quadrangle. QUADRAN′GULARLY, ad. *-lĕr-lĭ*.

QUADRANT, n. *kwŏd′rănt* [L. *quadrans* or *quadran′tem*, a fourth, a quarter: It. *quadrante*]: in *geom.*, the quarter of a circle; an arc of 90°: in *nav.* and *astron.*, instr. for taking elevations, adapted for measuring an arc of not more than 90° (see below). QUADRANT′AL, a, *-răntăl*, pert. to a quadrant or included in it. QUADRANS, n. *kwŏd′rănz*, the fourth part of the Roman coin called an *as*.

QUAD'RANT: literally the fourth part of a circle, or 90°; but signifying, in astronomy, an instrument used for determination of angular measurements. The quadrant consisted of a limb or arc of a circle equal to the fourth part of the whole circumference, graduated into degrees and parts of degrees. The Q. employed by Ptolemy was of stone, with one smooth and polished side, on which the graduations were made; the Q. was firmly placed in a meridian plane, with one radius vertical, the other horizontal. Tycho Brahé, who has a right to be considered as the first great practical astronomer of modern times, fixed his Q. on a wall, and employed it for the determination of meridian altitudes; he also adjusted others on vertical axes for measurement of azimuths. Picart was the first who applied telescopic sights to this instrument. About this time the large mural Q. (of 6 to 8 ft. radius) began to be introduced into observatories: these were adjusted in the same way as the mural circle (see CIRCLE, MURAL). Various innate defects of the Q. as an instrument—such as the impossibility of securing exactness of the whole arc, concentricity of the centre of motion with the centre of division, and perfect stability of the centre-work—led to its being superseded by the repeating circle, otherwise called the *Mural Circle*.



Hadley's Quadrant.

Gunner's Quadrant.

Hadley's Quadrant is properly an *octant*, as its limb is only the eighth part of a circle, though it measures an arc of 90°: its principle is that of the SEXTANT (q.v.).

QUADRAT, n. *kwod'răt* [F. *quadrat* or *cadrat*, a quadrat—from L. *quadrātus*, squared]: in *printing*, a piece of type-metal cast less in depth than the type, used to fill void spaces in a line or page, so as to leave a blank space on the paper when printed from.

QUADRATE, a. *kwōd'rāt* [L. *quadrātus*, squared—from *quadra*, a square—from *quat'tŏr* four: It. *quadrare*, to square]: squared; having four equal sides and four right angles; divisible into four equal parts; equal; exact; correspondent: N. a square: V. to reduce to a square; to suit; to correspond. QUAD'RATING, imp. QUAD'RATED, pp. QUADRATIC, a. *kwōd-răt'ĭk*, pert. to or containing a square. QUADRATIC EQUATION, in *alg.*, an equation involving the second power of the unknown quantity (see EQUATIONS). QUADRATRIX, n. *kwōd-rā'trĭks*, in *geom.*, a curve by means of which straight lines equal to the circumferences of circles or other curves,

and their various parts, may be found mechanically. QUADRATURE, n. *kwod'ra-tūr*, the act of squaring: the reducing of a figure to a square: in *math.* (see below): in *astron.*, the position of a heavenly body, when the lines from the earth to the sun and it form an angle of 90°—applied particularly to the moon in its first and last quarters. QUADRATUS, *a. kwod-rā'tus*, in *anat.*, applied to certain muscles from their shape, as QUADRATUS FEMORIS *fem'o-ris* [L. *femur*, thigh, *femoris*, of the thigh].

QUADRATURE, *kwod'ra-tūr*, n. Mathematics: the process of determining the area of a surface. Its derivation indicates its nature—i.e., it consists in determining a *square* (the simplest mode of surface) whose area is equal to that of the assigned surface. In many cases, of which the Triangle (q.v.), the Parabola (q.v.), and the Cycloid (q.v.) are perhaps the simplest, the area is easily assigned in terms of some simple unit. Thus, the area of a triangle is half that of the rectangle with the same base and height; that of any parabolic segment is two-thirds of the corresponding triangle, whose sides are the chord and the tangents at its extremities; that of the cycloid three times that of its generating circle, etc.

The term is applied also in a special sense in cases in which an area or other quantity is expressed by an integral, whose value cannot be determined exactly; and it is then used for the process of approximation by which the value of the integral can be gradually arrived at.

All the practical rules for approximating to the areas of curvilinear figures, and the volumes of various solids —such as occur in land-measuring, gauging, engineering, etc.—are, in this sense, cases of quadrature, except in those very special cases in which an area or a volume can be assigned exactly as a finite function of its dimensions. See MENSURATION.

QUADRATURE OF THE CIRCLE: one of the grand mathematical problems of antiquity, which, unsolved and probably unsolvable, continue to occupy even in the present day the minds of many curious speculators. The trisection of an angle, the duplication of the cube, and the perpetual motion have found, in every age of the world since geometry and physics were studied, their hosts of patient devotees. For the *physical* question involved in the Perpetual Motion, see that title. Here are to be noticed the *mathematical* questions involved in the other problems above mentioned; especially that of the quadrature of the circle, in which the difficulty is of a different nature from that in the other two geometrical ones. A few words about them, however, will help as an introduction.

According to the postulates of ordinary geometry, all constructions must be made by the help of the circle and straight line. Straight lines intersect each other in but *one* point; and a straight line and circle, or two circles, intersect in *two* points only. From the analytical

point of view we may express these facts by saying that the determination of the intersection of two straight lines involves an equation of the *first* degree only; while that of the intersection of a straight line and a circle, or of two circles, is reducible to an equation of the second degree. But the trisection of an angle, or the duplication of the cube, requires for its accomplishment the solution of an equation of the *third* degree; or, geometrically, requires the intersections of a straight line and a curve of the third degree, or of two conics, etc., *all of which are excluded by the postulates of the science.* If it were allowed that a parabola or ellipse could be described with a given focus and directrix, as it is allowed that a circle can be described with a given radius about a given centre, the trisection of an angle and the duplication of the cube would be at once brought under the category of questions resolvable by pure geometry; so that the difficulty in these cases is one of mere restriction of the postulates of what is to be called geometry.

It is very different in the case of the quadrature of the circle, which (see QUADRATURE, in Math.) means the determination of the area of a circle of given radius—literally, the assigning of the side of a square whose area shall be equal to that of the given circle.

The common herd of 'squarers of the circle,' which grows more numerous every day, and which includes many men of undoubted sanity, and even of the very highest business capacities, rarely have any idea of the nature of the problem that they are attempting to solve. It is, therefore, best to show first *what has been done* toward the solution of the problem; a few remarks may then be ventured as to *what may yet be done*, and in what direction philosophic 'squarers of the circle' must look for real advance.

In the first place, we observe that *mechanical processes are utterly inadmissible.* A fair approximation may, no doubt, be made by measuring the diameter of a circular disk of uniform material, and comparing the weight of the disk with that of a square portion of the same material of given side. But it is almost impossible to execute any measurement to more than six places of significant figures; hence, as will soon be shown, this process is at best but a rude approximation. The same is to be said of such obvious processes as wrapping a string round a cylindrical post of known diameter, and comparing its length with the diameter of the cylinder: only a rude approximation to the ratio of the circumference of a circle to its diameter can thus be obtained.

Before entering on the history of the problem, it must be remarked that the Greek geometers knew that the area of a circle is half the rectangle under its radius and circumference (see CIRCLE), so that the determination of the length of the circumference of a circle of given radius is precisely the same problem as that of the quadrature of the circle.

Archimedes proved that the ratio of the diameter to the circumference is greater than 1 to $3\frac{10}{71}$, and less than $1\frac{1}{70}$ to 3. The difference between these two extreme limits is less than the $\frac{1}{1500}$ of the whole ratio. Archimedes's process depends on the obvious truth, that the circumference of an inscribed polygon is less, while that of a circumscribed polygon is greater, than that of the circle. His calculations were extended to regular polygons of 96 sides.

Little more seems to have been done by mathematicians till the end of the 16th c., when P. Métius gave the expression for the ratio of the circumference to the diameter as the fraction $\frac{355}{113}$, which, in decimals, is true to the seventh significant figure inclusive. Curiously, it happens that this is one of the convergent fractions which express in the lowest possible terms the best approximations to the required number. Métius seems to have employed, with the aid of far superior arithmetical notation, a process similar to that of Archimedes.

Vieta shortly afterward gave the ratio in a form true to the tenth decimal place, and was the first to give, though of course in infinite terms, an exact formula. Designating, as is usual in mathematical works, the ratio of the circumference to the diameter by π, Vieta's formula is—

$$\frac{1}{\pi} = \tfrac{1}{2} \times \tfrac{1}{2} \times \sqrt{\tfrac{1}{2}} \times \sqrt{\tfrac{1}{2} + \tfrac{1}{2}\sqrt{\tfrac{1}{2}}} \times \sqrt{\tfrac{1}{2} + \tfrac{1}{2}\sqrt{\tfrac{1}{2} + \tfrac{1}{2}\sqrt{\tfrac{1}{2}}}} \times \text{etc.}$$

Shortly afterward, Adrianus Romanus, by calculating the length of the side of an equilateral inscribed polygon of 107,374,824 sides, determined the value of π to 16 significant figures; and Ludolph van Ceulen, his contemporary, by calculating that of the polygon of 36,893,488,147,419,103,232 sides, arrived (correctly) at 36 significant figures. It is scarcely possible to give, in the present day, an idea of the enormous labor which this mode of procedure entails even when only 8 or 10 figures are sought; and when we consider that Ludolph was ignorant of logarithms, we wonder that a lifetime sufficed for the attainment of such a result by the method that he employed.

The value of π was thus determined to $\frac{1}{3 \times 10^{35}}$ of its amount, a fraction of which, after Montucla, we shall attempt to give an idea, thus: Suppose a circle whose radius is the distance of the nearest fixed star (250,000 times the earth's distance from the sun), the error in calculating its circumference by Ludolph's result would be so excessively small a fraction of the diameter of a human hair as to be utterly invisible, not merely under the most powerful microscope yet made; but under any which future generations may be able to construct.

These results were, as we have pointed out, all derived by common arithmetical operations, based on the ob-

vious truth that the circumference of a circle is greater than that of any inscribed, and less than that of any circumscribed, polygon. They involve none of those more subtle ideas connected with Limits, Infinitesimals, or Differentials, which seem to render more recent results suspected by modern 'squarers.' If one of that unhappy body would only consider this simple *fact*, he could hardly have the presumption to publish his 3·125, or whatever it may be, as the accurate value of a quantity which by common arithmetical processes, founded on an obvious geometrical truth, was several centuries ago shown to be greater than

3·14159265358979323846264338327950288,

and less than

3·14159265358979323846264338327950289.

We now know, by far simpler processes, its exact value to more than 600 places of decimals; but the above result of Von Ceulen is much more than sufficient for any possible practical application even in the most delicate calculations in astronomy.

Snellius, Huyghens, Gregory de Saint Vincent, and others suggested simplifications of the polygon process, which are in reality some of the approximate expressions derived from modern trigonometry.

In 1668 the celebrated James Gregory gave a demonstration of the impossibility of effecting exactly the quadrature of the circle, which, though objected to by Huyghens, is now received as satisfactory.

We merely advert to the speculations of Fermat, Roberval, Cavalleri, Wallis, Newton, and others as to quadrature in general—their most valuable result was the invention of the Differential and Integral Calculus by Newton, under the name Fluxions and Fluents. Wallis, however, by an ingenious process of interpolation, showed that

$$\frac{\pi}{4} = \frac{2.4.4.6.6.8.8.10.10.\text{ etc.}}{3.3.5.5.7.7.9.9.11.\text{ etc.}}$$

which is interesting, as being the first recorded example of the determination, in a finite form, of the value of the ratio of two infinite products.

Lord Brouncker, being consulted by Wallis as to the value of the above expression, put it in the form of an infinite continued fraction, thus:

$$\frac{\pi}{4} = \cfrac{1}{1+\cfrac{1}{2+\cfrac{9}{2+\cfrac{25}{2+\cfrac{49}{2+\text{ etc.}}}}}}$$

in which 2 and the square of the odd numbers appear. This formula has been employed to show that not only π, but its square, is incommensurable.

Perhaps the simplest of all the formulas which have been given for the calculation of the circle, is that of James Gregory for the arc in terms of its tangent—namely,

$$\theta = \tan.\ \theta - \tfrac{1}{3}\tan.\ ^3\theta + \tfrac{1}{5}\tan.\ ^5\theta - \text{etc.}$$

This was apparently first [illegible] and formed perhaps the first of that astonishing series of revelations from English mathematicians which have crowned the name of a man of real genius.

If we make use, by ordinary trigonometry, the arc whose tangent is unity (the arc of 45° or $\frac{\pi}{4}$) falls short of four times the arc whose tangent is $\frac{1}{5}$ or an angle whose tangent is $\frac{1}{239}$. We may easily calculate $\frac{\pi}{4}$ to any required number of decimal places by subtracting from Gregory's formula the series of terms corresponding to $\frac{1}{5}$ and $\frac{1}{239}$ as arguments. And it is in fact, by a slight modification of this process (employing, however, Machin), that π has been computed, by independent calculators, to 699 decimal places.

It is not yet proved, and it may not be true, that the area of the circle (or, if a curve cannot be expressed in finite terms, that of some curve) contains irrational quantities. The integral calculus gives, among hosts of others, the following very simple expression in terms of a definite integral:

$$\frac{\pi}{2} = \int_0^1 \frac{dx}{\sqrt{1 - x^2}}$$

Now it very often happens that the value of a definite integral can be assigned, when that of the general integral cannot: and it is not impossible, so far as is yet known, that the above integral may be expressed in some such form as

$$\sqrt{a} + \sqrt{b},$$

where a and b are fractional numbers. Such an expression, if discovered, would not totally be hailed as a solution of the grand problem.

But this, we need hardly say, is *not* the species of solution attempted by 'squarers': on this painful yet ridiculous subject see Prof. De Morgan's *Budget of Paradoxes*: and the interesting work of Montucla, *Histoire des Recherches sur la Quadrature du Cercle*.

QUADREL, n. *Encycl.* [Fr. *quadrello*, a square brick—from L. *quadrus*, a square]: in *Arch.*, a kind of artificial stone or brick made from chalky earth, and molded into a square form.

QUADRENNIAL, a. *kwŏd-rĕn'nĭ-ăl*, or QUAD'RIEN'NIAL, a. *-rĭ-ĕn'nĭ-ăl* [L. *quadrien'nium*, a period of four years —from *quat'ŭŏr*, four; *annus*, a year]: occurring once in four years; comprising four years. QUADREN'NIALLY, ad. *-lĭ*.

QUADRIBASIC, a. *kwŏd'rĭ-bās'ĭk* [prefix *quadri-*; Eng. *basic*]: in *chem.*, having four parts of base to one of acid.

QUADRIC, n. *kwŏd'rĭk* [L. *quadrus*, square, fourfold]: in *alg.*, a homogeneous expression of the second degree in the variables or factients. Ternary and quaternary quadrics, equated to zero, represent respectively curves and surfaces, which have the property of cutting every line in the plane, or in space, in two points, and to which also the name quadric is applied. Plane quadrics, therefore, are identical with conic sections.

QUADRICAPSULAR, a. *kwŏd'rĭ-kăp'sū-lĕr* [L. *quat'ŭŏr*, four; *capsŭlă*, a small box]: in *bot.*, having four capsules.

Quadricapsular.

QUADRICORNOUS, a. *kwŏd'rĭ-kŏr'nŭs* [L. *quat'ŭŏr*, four; *cornu*, a horn]: in *zool.* or *entom.*, having four horns or four antennæ.

QUADRICOSTATE, a. *kwŏd'rĭ-kŏs'tāt* [L. *quat'ŭŏr*, four; *costa*, a rib]: having four ribs.

QUADRIDECIMAL, a. *kwŏd-rĭ-dĕs'ĭ-mal* [prefix *quadri-*, Eng. *decimal*]: in *crystal.*, applied to a crystal whose prism, or the middle part, has four faces and two summits, containing together ten faces.

QUADRIDENTATE, a. *kwŏd'rĭ-dĕn'tāt* [L. *quat'ŭŏr*, four; *dentātus*, toothed—from *dens*, a tooth]: having four teeth.

QUADRIENNIUM UTILE, *kwŏd-rĭ-ĕn'nĭ-ŭm ū'tĭ-lē*, in Scotch Law: the four years after majority during which a person is entitled to reduce or set aside any deed made to his prejudice during minority.

QUADRIFARIOUS, a. *kwŏd'-rĭ-fā'rĭ-ŭs* [L. *quadrifāriæ* fourfold—from *quat'ŭŏr*, four]: in *bot.*, in four rows; proceeding from all the sides of the branch.

QUADRIFID, a. *kwŏd'rĭ-fĭd* [L. *quadrifĭdus*, four-cleft —from *quat'ŭor*, four; *findo*, I cleave; *fidi*, I have cleft]: in *bot.*, four-cleft; cut down into four parts to about the middle.

QUADRIFOLIATE, a. *kwŏd'rĭ-fō'lĭ-āt* [L. *quat'ŭŏr*, four; *fŏlĭātus*, leaved—from *fŏlium*, a leaf]: in *bot.*, having four leaflets diverging from the same point.

QUADRIFURCATE, a. *kwŏd'rĭ-fŭr'kāt* [L. *quat'ŭŏr*, four; *furca*, a two-pronged fork]: in *bot.*, doubly forked; divided into two pairs.

QUADRIGA, n. *kwŏd′rĭ-gȧ* [L. *quadrīga*—*in re* of *quat′ŭor*, four; *jugum*, a yoke]: in *anc. times*, a car drawn by four horses abreast, used chiefly in triumphal processions. See CHARIOT.

Quadriga.

QUADRIGEMINOUS, a. *kwŏd′rĭ-jĕm′ĭ-nŭs*, or QUAD′RIGEM′INAL, a. *jĕm′ĭ-năl* [L. *quat′ŭor*, four; *gemĭnī*, twins]: in *bot.*, fourfold; having four similar parts.

QUADRIGENARIOUS, a. *kwŏd′rĭ-jĕn-ā′rĭ-ŭs* [L. *quadringēnārĭŭs*, of four hundred each; *quadringēnī* or *quadrigēnī*, four hundred each—from *quat′ŭor*, four, and *centum*, a hundred]: consisting of four hundred.

QUADRIJUGOUS, a. *kwŏd′rĭ-jōō′gŭs* [L. *quadrijŭgus*, belonging to a team of four—from *quat′ŭor*, four; *jugum*, a yoke, a pair]: in *bot.*, having four pairs of leaflets.

QUADRILATERAL, a. *kwŏd′rĭ-lăt′ĕr-ăl* [It. *quadrilatero*, quadrilateral: F. *quadrilatère*, a quadrilateral: L. *quadrilatĕrus*, four-sided—from *quat′ŭor*, four; *latus*, a side]: having four sides and four angles: N. in *geom.*, a plane figure having four sides: in *mil.*, the area encompassed and defended by four fortresses. It involves a combination of four fortresses, not necessarily connected, but mutually supporting each other, so that if one be attacked, the garrisons of the others, unless carefully observed, will harass the besiegers, rendering it necessary that a very great army should be employed to turn the combined position. As a remarkable instance,

The Venetian Quadrilateral.

and a very powerful one, may be cited the Venetian Quadrilateral (Austrian till 1866), comprising the four strong posts of Mantua, Verona, Peschiera, and Legnago.

These form a sort of outwork to the bastion which the southern mountains of the Tyrol constitute, and divide the n. plain of the Po into two sections by a most powerful barrier. QUAD'RILAT'ERALNESS, n. *-nĕs*, the property of being quadrilateral.

QUADRILITERAL, a. *kwŏd'rĭ-lĭt'âv'r-ăl* [L. *quat'ŭŏr*, four; *lĭt'ĕrā*, a letter]: in *gram.*, consisting of four letters.

QUADRILLE, n. *kwâ-drĭl'* or *kă-drĭl'* [F. *quadrille*, a dance—from It. *quadriglia*, a troop or band of men formed into a square—from L. *quadrārĕ*, to make square—from *quat'ŭŏr*, four: Sp. *cuadrillo*, a small square]: game at cards played by four persons (see below): something consisting of fours: dance consisting of consecutive dance movements, usually five in number, danced by couples or sets of couples (pr b. originally four couples, whence the name), opposite to, and at right angles to each other.

QUADRILLE, *kwâ-drĭl'* or *kă-drĭl'*: game at cards, played by four persons. The number of cards employed is 40, the tens, nines, and eights being discarded from the pack. The rank and order of the cards in each suit vary according as they are or are not trumps, and are different in the black and red suits. The ace of spades, whatever suit be trumps, is always the highest trump, and is called *spadille;* the ace of clubs is always the third highest trump, and is known as *basto;* while the second highest trump, or *manille*, is the deuce of spades or clubs, or the seven of hearts or diamonds, according to the suit which is trumps, it being always of the trump suit. When the black suits are not trumps, the black cards rank as in whist; and when they are trumps, the order is the same, with the exception, as above mentioned, of the deuce, which then (in the trump suit only) becomes manille, the deuce of the black suit which is not trumps retaining its position as the lowest card. When the red suits are not trumps, the order of rank is as follows: King, queen, knave, ace, deuce, three, four, five, six, seven; but when they are trumps, the ace (of the trump suit only) is raised to the position of the fourth highest trump, under the name *ponto* or *punto*, and the seven (of the trump suit only) becomes, as previously stated, manille. A little consideration will show, that when the black suits are trumps, the number of trump cards is 11, and 12 when a red suit is trumps. The three highest trumps, spadille, manille, and basto, are called *matadores*, and the player who possesses one of them can, if he have no other trumps in his hand, decline to follow suit if trumps are led, provided the trump led is not a matadore of value superior to his own. After the cards have been shuffled, cut, and dealt, the elder hand, on looking at his cards, may, if his hand be weak, decline to play (or *pass*); the next player may do the same, and so on all round; in which case the elder hand must commence, naming the suit

which he wishes to be trumps, and the cards are laid, and tricks taken, as in ordinary card games. If a player does not pass, but commences the game by naming trumps and playing a card, he must himself make six tricks to win; and if he succeeds, he obtains the whole of the winnings; but if he loses, he pays the whole of the losses. If he commences the game by 'asking leave'—i.e., to have a partner—which is done by calling a king, the player who holds the king of the suit led must play it when his turn arrives; and he who asked leave, or *Ombre* (in England generally called *ombre*), with him who had the king called, or the *friend*, are from this time partners in the game, and divide either the gains or the losses, as the case may be. The ombre and the friend win the game if they make six tricks between them. This game is complicated by a number of conditions, which, under certain circumstances, modify the ordinary mode of playing.

A modification of this game, under the name *preference*, is played in some places. The game *Chombre*, which is nothing more than quadrille played by three persons, formerly greatly in vogue in England and France, is now quite obsolete. An accurate description of it is in Pope's *Rape of the Lock*. L'hombre was the immediate predecessor of quadrille in popular favor.

QUADRILLION, n. *kwŏd-dril'yun* [L. *quadra*, a square, and Eng. *million*]: the fourth power of a million, or a unit with 24 ciphers, according to the Eng. system: a unit with 15 ciphers, in the French and American system.

QUADRILOBATE, a. *kwŏd' ri-lō' bāt* or QUADRILOBED, a. *-lōbd* [L. *quat'ŭor*, four; Gr. *lobos*, a lobe]: in *bot.*, four-lobed.

QUADRILOCULAR, a. *kwŏd' ri-lok' ū-lăr* [L. *quat'ŭor*, four; *loc'ŭlus*, a little place]: in *bot.*, having four cells or chambers.

QUADRINOMIAL, a. *kwŏd' ri nō' mĭ-ăl* [L. *quat'ŭor*, four; *nomen*, a name]: in *alg.*, consisting of four denominations or terms. QUAD'RINOM'ICAL, a. *-nŏm'ĭ-kăl*, of four denominations or terms.

QUADRIPARTITE, a. *kwŏd' ri-pär' tīt* [L. *quadripartītus*, divided into four parts—from *quat'ŭor*, four; *partītus*, divided; *pars* or *partem*, a part]: divided into four parts; in *bot.*, divided deeply into four parts. QUADRIPAR'TITELY, ad. *-tīt-lĭ*. QUADRIPARTI'TION, n. *-tĭsh'ŭn*, a division into four parts; the taking of a fourth part of a quantity.

QUADRIPENNATE, a. *kwŏd' ri-pĕn' nāt* [L. *quat'ŭor*, four; *penna*, a feather]: having four wings.

QUADRIPHYLLOUS, a. *kwŏd' rĭ-fĭl' lŭs* [L. *quat'ŭor*, four; Gr. *phullon*, a leaf]: in *bot.*, having four leaves.

QUADRIREME, n. *kwŏd' rĭ-rēm* [L. *quadrīrēmis*—from *quat'ŭor*, four; *remus*, an oar]: in *anc. times*, a war-ship propelled by four banks of oars.

QUADRISACRAMENTARIAN, n. *kwŏd-rĭ-săk-ra-mĕntā′rĭ-an* [prefix *quadri-*; Eng. *sacramentarian*]: in *chh. hist.*, a controversial term applied to some German Reformers in Wittenberg and its neighborhood, who held that the sacraments of Baptism, the Eucharist, Confession, and Orders were generally necessary to salvation: mentioned by Melanchthon in *Loci Communes*.

QUADRISULCATE, a. *kwŏd′rĭ-sŭl′kāt* [L. *quat′ŭor*, four; *sulcus*, a furrow]: four-furrowed; having the hoof divided into four parts.

QUADRISYLLABLE, n. *kwŏd′rĭ-sĭl′lă-bl* [L. *quat′ŭor*, four; *syllaba*, a syllable]: a word of four syllables. QUAD′RISYLLAB′IC, a. *-lăb′ĭk*, consisting of four syllables.

QUADRIVALVES, n. plu. *kwŏd′rĭ-vălvz* [L. *quat′ŭor*, four; *valvæ*, the leaves of a door]: in *arch.*, a door with four folds or leaves. QUAD′RIVALVE, a. *-vălv*, or QUAD′RIVALV′ULAR, a. *-vălv′ū-lĕr*, in *bot.*, having four valves.

QUADRIVIUM, n. *kwŏd-rĭv′ĭ-ŭm* [L. *quadriv′ĭum*, a thing pert. to four ways—from *quat′ŭor*, four; *vĭă*, a way]: name given, in the language of the schools of the West, for the higher course of the mediæval studies, from its consisting of four branches, as the lower course, for an analogous reason, was called TRIVIUM (q.v.), or 'Three Roads' (grammar, rhetoric, and logic). The Q. consisted of arithmetic, music, geometry, and astronomy: the Q. and the trivium formed together the seven sciences of the schools. QUADRIV′IAL, *-rĭv′ĭ-ăl*, n. one of the four lesser arts: ADJ. having four ways meeting in a point.

QUADROON, n. *kwŏd-rôn′* [F. *quarteron*; Sp. *cuarteron*, a quadroon—from L. *quartus*, fourth—from *quat′ŭor*, four]: in *Amer.*, the offspring of a mulatto and a white person; one who is four removes from pure negro blood —written also QUARTERON, QUARTEROON, QUATERON.

QUADRULAMINAR, a. *kwŏd′rŭ-lăm′ĭ-nĕr* [L. *quat′ŭor*, four; *lamĭnă*, a leaf or layer]: consisting of fourfold laminæ or layers of cells of the blastoderm.

QUADRUMANA, *kwŏd-rō′ma-na*: in the zoological system of Cuvier, an order of *Mammalia*, which he places next after *Bimana* (q.v.), and which contains the animals most nearly resembling man in their form and anatomical characters—viz., the monkey and lemur families. The order Q., with the limits assigned to it by Cuvier, has been very generally received by naturalists, but the effort to assimilate man to apes has led to the institution of a new order, Primates, to take in all down to and including lemurs; it is the order, so named, of Linnæus, with bats omitted. The name Q. is derived from a character, in which one most obvious difference from man is, that the extremities of all the four limbs are *hands*, or formed for grasping, and not merely those of the anterior ones; these, indeed, being in many of the monkeys less perfect hands than the hinder ones,

through the lack or rudimentary character of the thumb. None of the Q. are naturally adapted for an erect posture. For the differences between man and the apes which most nearly approach him in form, see ANTHROPOLOGY; also MONKEY: CHIMPANZEE: GORILLA: ORANG. The Q. resemble man in their dentition more than any other animals. Their other digestive organs also exhibit a general similarity to those of man. The similarity is further apparent in the brain and in the reproductive organs; but in the *Lemuridæ*, a gradual departure from the human form and characters is manifested, with an approach to the ordinary quadruped type. Aside from the lemurs and man, at the two extremes, the classification of the Q. is (1) SIMIIDÆ, with four genera of anthropoids: *Troglodytes*, *Gorilla*, *Simia*, and *Hylobates*; (2) CERCOPITHECIDÆ, containing all the old-world monkeys; called Catarrhine, from the position and shape of the nostrils: (3) CEBIDÆ, or new world monkeys, termed Platyrrhine or broad-nosed, the nostrils being flat and far apart; they differ from the preceding in many anatomical details and have more prehensile tails: (4) HAPALIDÆ, the Marmosets, small and squirrel-like, with ear-tufts, and some with manes like miniature lions. Prof. Henry Alleyne Nicholson remarks that the great difference between man and monkeys *must* entail corresponding structural distinctions. This is true, whether these distinctions can be fathomed or not. And if man be wholly physical, as some contend, the vast difference also must be physical. It ill becomes the materialist to undervalue the distinctions.

Quadrumana: Head and Hands of Orang-outang (*Simia satyrus*): *a*, anterior hand; *b*, posterior.

QUADRUMANE, n., or QUADRUMAN, n. *kwŏd'rû-măn* [F. *quadrumane*, having four hands—from L. *quat'uŏr*, four; *manus*, the hand]: an animal having four hands corresponding to the hands of a man, as in the monkey tribe. QUADRUMANA, n. plu. *kwŏd-rō'ma-na*, the order of mammals which have four hand-like extremities, as in the monkey tribe (see above). QUADRUMANOUS, a. *kwŏd-rō'măn-ŭs*, having four hands.

QUADRUPED, n. *kwŏd'rû-pĕd* [L. *quad'rŭpes*, a four-footed animal—from *quat'uŏr*, four; *pes* or *pedem*, a foot]: a term employed both popularly and by scientific writers to designate *four-footed animals*: ADJ. four-footed.—*Quadruped* is not, however, the name of a class or order in systems of zoology. Popularly, it is almost always limited to those *Mammalia* which have four limbs well developed and formed for walking, and is scarcely ever applied to the *Cetacea*, and rarely even to Seals or

to the *Quadrumana* (q.v.). The full development of the limbs, with their termination in *feet* properly so called, thus appears to be not one of the most important characters by which groups of animals are distinguished; and this further appears when the same character is found again, in great perfcetion, in a lower class of vertebrate animals—in Chelonian and Saurian Reptiles, as tortoises and lizards. But the *four-limbed* type prevails among vertebrate animals, from man downward; so that even in serpents, in which it is least notable, traces of it appear on anatomical examination, as in the case of Boas (see Boa); and there are many other creatures which form connecting links as to this character between serpents and those reptiles—as crocodiles and lizards—which possess it in greatest perfection. For the homology of certain fins of fishes with the limbs of quadrupeds, see Fishes. No approach to the four-limbed type is found among invertebrate animals.

QUADRUPLE, a. *kwŏd'rŭ-pl* [F. *quadruple*—from L. *quadrŭplus*, fourfold—from *quatŭor*, four; *plico*, I fold: It. *quadruplo*]: fourfold: N. four times the sum or quantity: V. to multiply by four, Quad'rupling, imp. *-plĭng*. Quad'rupled, pp. *-pld*: Adj. multiplied by four. Quad'ruply, ad. *-plī*, to a fourfold quantity. Quadruplicate, a. *kwŏd-rōō'plĭ-kāt* [L. *plĭcātus*, folded]: fourfold: V. to make fourfold; to double twice. Quadru'plica'ting, imp. Quadru'plicated, pp. Quadru'plica'tion, n. *-kā'shŭn*, the taking four times the simple sum or amount. Quadruple alliance, in *Eng. hist.*, an alliance, 1718-19, between England, France, Germany, and Holland, to secure to the house of Hanover the succession to the crown of England; to secure France to the house of Bourbon; and to prevent Spain and France being united under one crown: the term has been also applied to an alliance between England, France, Spain, and Portugal, in 1834, to restore peace to Spain, and put down Don Carlos and his partisans. Quad'ruple-coun'terpoint, n. the construction of four melodies or parts to be performed together in such a manner that they can be interchanged without involving the infringement of the laws of musical grammar.

QUADRUPLEX TELEGRAPH: see under Telegraph.

QUÆRE, n. *kwē'rē* [impera. of L. *quæro*, I search or inquire]: search; inquire, implying doubt: see Query.

QUÆSTOR, n. *kwĕs'tŏr* [L. cont. from *quæsitor*, searcher or investigator]: anciently the title of a class of Roman magistrates, as early, according to all accounts, as the period of the Kings. The oldest quæstors were the two *quæstores parricidii* ('trackers of murder,' ultimately public accusers); whose office was to conduct the prosecution of persons accused of murder, and to execute the sentence that might be pronounced. They ceased to exist as early as B.C. 366, when their functions were transferred to the *Triumviri Capitales*. A far more

important though later magistracy was the *quæstores classici*, to whom was intrusted the charge of the public treasure. The exact date of their institution is unknown, but it was subsequent to the expulsion of the kings. They appear to have derived the epithet *classici* from having been originally elected by the centuries. At first they were only two in number, but B.C. 421 two more were added. Shortly after the breaking out of the first Punic war, the number was increased to eight; and as province after province was added to the Roman Republic, they amounted, in the time of Sulla, to 20 and in the time of Cæsar to 40. On its institution the quæstorship (*quæstura*) was open only to patricians; but after B.C. 421 plebeians also became eligible.—The title has been given also to an official in charge—e.g., of the legislative assembly of France.

QUAFF, v. *kwâf* [an imitative word: Scot. *waucht* or *waught*, to drink copiously; *quaich*, a small drinking-cup with two ears: Gael. *cuach*, a cup or bowl]: to swallow in large draughts; to drink copiously and luxuriously. QUAFF'ING, imp.: N. the act of one who quaffs; a drinking. QUAFFED, pp. *kwâft*. QUAFF'ER, n. *-ér*, one who quaffs or drinks largely.

QUAG, n. *kwăg* [a corruption of *quake*]: a quagmire. QUAG'GY, a. *-gi*, yielding or trembling under foot, as soft, wet earth, or a bog.

QUAGGA, n. *kwăg'gă* [Hottentot, *quagga*—from its cry], (*Equus*—or *Asinus*—*Quagga*): animal of family *Equidæ* (q.v.), native of S. Africa, rather smaller than the Zebra (q.v.), with the hinder parts higher, and the

Quagga (*Asinus Quagga*).

ears shorter; the head, mane, neck and shoulders blackish-brown, banded with white; similar bands toward the rump, gradually becoming less distinct; a black line running along the spine. It is allied both to the ass

and to the zebra. The Q. receives its name from its voice, which somewhat resembles the barking of a dog. It is more easily domesticated than the zebra, and a curricle drawn by quaggas has been seen in Hyde Park, London. In its wild state it does not associate with the zebra, though inhabiting the same plains. Hybrids, or mules, have been produced between the horse and quagga.

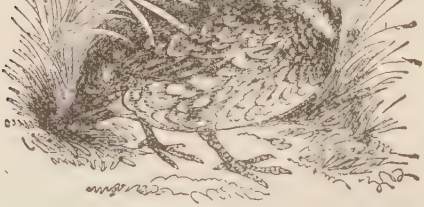
QUAGMIRE, n. *kwăg′mīr* [from Eng. *quake* and *mire*: Dut. *waggelen*, to totter]: wet boggy land firm enough on the surface to be walked on, but yielding or trembling under the feet at every step; a shaking marsh; boggy ground.

QUA′HAUG, or QUA′HOG: see VENERIDÆ.

QUAID, a. or pp. *kwād* [contr. of *quailed*]: in *OE.*, crushed; dejected; cowed; depressed.

QUAIL, v. *kwāl* [in the sense of causing the blood to curdle from bodily fear: It. *quagliare*, to curdle as milk; *cagliare*, to curdle, to quail in one's courage: Dut. *quaghel*; L. *cŏag′ulum*, the infusion used to curdle milk—from *con*, together; *agĕrĕ*, to drive: comp. Dut. *quelen*, to pine away]: to quake; to tremble under bodily fear or horror; to faint; to languish; to give way. QUAIL′ING, imp. QUAILED, pp. *kwāld*: ADJ. languishing; losing courage: N. a failing in resolution.

QUAIL, n. *kwāl* [Dut. *quackel*, a quail; *quacken*, to cry as a quail: It. *quaglia*, a quail: F. *caille*], (*Coturnix*): genus of gallinaceous birds of family *Tetraonidæ*, nearly allied to partridges, but having a more slender bill, a shorter tail, longer wings, no spur, and no red space above the eye. The first and second quills of the wing are about as long as the third, which is the longest in the more rounded wing of the partridges. Quails,



Common Quail (*Coturnix vulgaris*).

therefore, far excel partridges in power of flight. The tail is very short. They never perch on trees, but always alight on the ground. They are among the smallest gallinaceous birds. The N. Amer. Q. have been made a sub-family *Odontophorinæ*; but with little reason, as the toothing of the under mandible is not an invariable

difference.—The BOB WHITE (*Ortyx virginiana*), called Q. wherever the Ruffed Grouse is known as partridge, and called Partridge wherever that grouse is known as pheasant, ranges from the e. states to the high western plateau; the color is pinkish brown, variegated all over, the female with buff throat. A Fla. variety, as usual with southern representatives of our birds, is smaller, darker, and with larger bill. A Tex. variety, as usual with representatives on w. plains, is paler and grayer. —The PLUMED PARTRIDGE or MOUNTAIN Q. (*Oreortyx picta*), of Or., Cal., and Nev., has the head adorned with two long recurved plumes, and the sides of the body with broad bars of black and white.—The VALLEY Q. or CALIFORNIA PARTRIDGE (*Lophortyx californica*) has a helmet crest of 6-10 recurved feathers; and the ARIZONA Q. (*L. Gambeli*) differs in having the middle of the belly black, and in other details of color.—The BLUE Q. or SCALED PARTRIDGE (*Callipepla squamata*), Tex., N. Mex., and Ariz., has the feathers with a scale-like black edging.—The MASSENA Q. (not Messina), of the same region, is marked beneath with countless round white spots. The 40 or more species of Q. are alike in habits and food.—The COMMON Q. (*C. vulgaris* or *C. dactylisonans*) is found in most parts of Europe, Asia, and Africa. In India and other warm countries, it is a permanent resident; but in many countries it is a bird of passage; thus it visits n. Europe, and at certain seasons appears in vast multitudes on the coasts and islands of the Mediterranean, where quails are taken in hundreds of thousands in their northward and southward migrations. There is reason to believe that the food miraculously supplied to the Israelites in the wilderness was this species of bird, to which the name *Selav*, used in the Mosaic narrative, seems to belong. The Q. is fully 7 inches in entire length; of brown color, streaked with different shades, and the wings mottled with light-brown; the throat white, with dark-brown bands in the male, and a black patch beneath the white, the lower parts yellowish-white. The Q. is polygamous. The nest is a mere hole in the ground, with 7 to 12 eggs. The Q. is highly esteemed for the table: great numbers are brought from the continent of Europe to the London market.—Other species of Q. are found in different parts of Asia, though no other is so abundant as the Common Q., and none migrates as it does.—The Coromandel Q. (*C. textilis*) is a pretty little bird, rather smaller than the Common Q.—The Chinese Q. (*C. excalfactoria*), a beautiful little species, only about 4 inches long, is abundant in China, and is there kept for fighting, the males being very pugnacious, like those of other polygamous birds, and much money is lost and won on the combats of these quails. It is used also for a singular purpose—warming the hands of its owner. QUAIL-PIPE, a pipe or call for alluring quails into a net.

QUAINT, a. *kwānt* [OF. *coint*, neat, dainty: L. *comptus*, trim—from *cōmo*, I adorn: OE, *coynt*]: characterized by excess and whimsicality; not expressed or shown in the ordinary way; odd; fanciful; singular; affected; in *OE.*, neat; pretty; fine-spun; affected. QUAINT'LY, ad. *-lĭ*. QUAINT'NESS, n. *-nĕs*, oddness; peculiarity.—SYN. of 'quaint': odd; whimsical; strange; queer; wonderful; singular; unusual; ingenious; artful; far-fetched; affected; antique; nice; dainty; curious.

QUAKE, v. *kwāk* [Ger. *quackeln*, to shake, to waver: Dut. *waggelen*, to stagger: AS. *cwacian*, to quake or tremble]: in *OE.*, a shudder; a tremulous agitation: V. to tremble with cold or fear; to be agitated, as the earth by internal movements; to shudder; in *OE.*, to throw into trepidation; to frighten. QUA'KING, imp.: ADJ. trembling; shaking: N. trepidation. QUAKED, pp. *kwākt*. QUA'KINGLY, ad. *-lĭ*, tremblingly; in a quaking manner. QUA'KER, n. *-kĕr*, term applied to the religious sect the Society of Friends, given first in reproach (see QUAKERS). QUA'KERLY, ad. *-lĭ*, after the manner of a Quaker. QUA'KERISH, a. pertaining or relating to Quakers; resembling Quakers; characteristic of Quakers. QUA'KERISM, n. *-ĭzm*, manners or tenets of the Quakers. —SYN. of 'quake, v.': to quiver; shake; shudder; vibrate; tremble; agitate.

QUAKERS, *kwā'kĕrz*: ordinary colloquial designation of the Society of Friends (q.v.). In law, Quakers differ from their fellow-citizens chiefly as regards their marriages and their taking of oaths. Thus, though in England the marriage acts required all marriages to take place in a consecrated church of the establishment, before the dissenters obtained a relaxation of the law, the Quakers' marriages were excepted, and marriages between two Quakers were allowed to be solemnized according to the usages of their sect. In regard to taking oaths, it is provided by statutes in England and the United States that persons who conscientiously object to take an oath in the usual way, may make an affirmation instead, whether as witness in a court of justice, or as holding a civil office, whose qualification includes taking an oath. The penalties of perjury, however, attach to a false affirmation in the same way as to a false oath.

QUAK'ING GRASS (*Briza*): genus of grasses, having a loose panicle; drooping spikelets, generally remarkable for their broad and compressed form, suspended by most delicate footstalks, and tremulous in every breath of wind; the spikelets with two glumes and numerous florets, the florets having each two awnless paleæ, which become incorporated with the seed. The species are few, mostly European. They all are very beautiful. *B. maxima*, native of s. Europe, is often planted in flower-gardens, in this country as well as in Europe; it has many-flowered heart-shaped spikelets, tumid, purplish, becoming dry and papery so as to rattle in the

breeze, for which reason it is known also as Rattlesnake Grass. *B. media*, the species common in Europe, growing in almost all kinds of poor soil, from the sea-coast to an elevation of 1,500 feet, is of some value as pasture-grass, being very nutritious, though the herbage is scanty. The value of many poor pastures depends on it; but when they are enriched by manures, it generally disappears. It is sometimes sown by farmers, but not as often as it would be if its seed did not lose vitality

Quaking Grass (*Briza media*).

so quickly that only a small proportion grows if not sown in autumn when newly ripened.

QUALIFY, v. *kwŏl'i-fi* [F. *qualifier*—from mid. L. *qualificārĕ*, to qualify—from L. *quālis*, of what sort or kind; *facĭō*, I make]: to fit or prepare for anything, as an office; to render capable or competent; to soften; to diminish; to ease; to modify or limit, as a statement; to dilute; to take the necessary steps for holding an office or exercising a privilege. QUAL'IFYING, imp.: ADJ. modifying; restraining; furnishing with legal power: N. the act of one who qualifies for a place or station. QUAL'IFIED, pp. *-fīd*: ADJ. fitted; competent. QUAL'IFIEDLY, ad. *-fīd-lĭ*. QUAL'IFIEDNESS, n. *-nĕs*, the state of being qualified or fitted. QUAL'IFIER, n. *-fī-ĕr*, one who or that which qualifies. QUAL'IFI'ABLE, a. *-fī'ă-bl*, that may be qualified. QUAL'IFICA'TION, n. *-fĭ-kā'shŭn* [F.—L.]: any natural endowment, or any acquirement, en-

abling a person to fill a particular office or position; regal power or ability; abatement; modification. QUAL-IFICA'TIVE, a. *-tĭv*, having the power to qualify or modify: N. that which serves to qualify. QUAL'IFICA'TOR, n. *-kā'tẽr*, in *Rome*, an officer who prepares cases for trial in the ecclesiastical court.—SYN. of 'qualify': to fit; capacitate; adapt; equip; prepare; enable; dilute; ease; abate; assuage; restrict; restrain, modify; soften; regulate;—of 'qualified': competent; entitled; fit; adapted; limited; modified.

QUALITY, n. *kwŏl'ĭ-tĭ* [F. *qualité*—from L. *qualitas* or *qualitātem*, a quality or property—from *quālis*, of what sort or kind: It. *qualita*, quality]: that which belongs to a body or substance; nature, as of an action; the power or property of producing certain effects; disposition; temper; virtue or vice; acquirement; condition in relation to others; superior rank or distinction; *formerly*, persons of high rank taken collectively. QUAL'ITATIVE, a. *-tă-tĭv*, connected with or relating to quality; in *chem. analysis*, intended merely to determine the nature or the names of component parts. QUAL'ITA'TIVELY, ad. *-tĭv-lĭ*. —SYN. of 'quality': property; adjunct; disposition; temper; accomplishment; qualification; character; rank; nobility.

QUALM, n. *kwâm* [AS. *cwealm*, destruction, death: Dan. *quæle*, to choke: Ger. *qual*, agony, grief]: a feeling of sickness; a sudden fit of nausea; a distressing thought; an uneasiness of conscience. QUALM'ISH, a. *-ĭsh*, affected with nausea or sickly languor; sick at the stomach. QUALM'ISHLY, ad. *-lĭ*. QUALM'ISHNESS, n. *-nĕs*, nausea.

QUAMASH, *kwŏm'ăsh*, or BISCUIT ROOT, *bĭs'kĭt rôt* (*Camassia esculenta*): plant of nat. order *Liliaceæ*, nearly allied to squills and hyacinths. It is a N. Amer. plant, abounding on the great prairies w. of the Mississippi. The roasted bulbs are agreeable and nutritious, and are used as food.

QUANDARY, n. *kwŏn-dā'rĭ* [perhaps a corruption of F. phrase, *qu'en dirai-je?* what shall I say of it? comp. Icel. *vandr*, difficult]: doubt; uncertainty; a state of difficulty or uncertainty.

QUANG-NAM, or KUANG-NAM, *kwâng-nâm'*, or TURON *tō-rŏn':* town of Anam, about 75 m. s.e. by e. from Hué (q.v.), or Phu-thuan-thien, capital of Anam. It is situated near the head of a beautiful gulf, and is a place of considerable trade.

QUANNET, n. *kwân'ĕt* [etym. doubtful]: the flat file of the comb-maker, having the handle at one side, so that it may be used like a plane. The teeth incline 15° forward, and are made by a triangular file, not by a chisel.

QUANT, n. *kwŏnt:* a small piece of flat wood at the bottom of a leaping-pole in marshy places, or of a pole used by a bargeman to push along his vessel, to prevent its sinking too easily under his weight.

QUANTIC, n. *kwân'tik* [L. *quantus*, how much]: in *math.*, a rational, integral, homogeneous function of two or more variables. They are classified, according to their dimensions, as quadric, cubic, quartic, quintic, etc., denoting quantics of the second, third, fourth, fifth, etc., degrees. They are further distinguished as binary, ternary, quaternary, etc., according as they contain two, three, four, etc., variables.

QUANTIFY, v. *kwân'ti-fī* [L. *quantus*, how much; *fīō*, I am made]: to modify or qualify with respect to quantity; to mark with the sign of quantity. QUAN'TIFYING, imp. QUAN'TIFIED, pp. *-fīd.* QUAN'TIFICA'TION, n. *-fi-kā'shŭn*, a modification by a reference to quantity; process or form by which anything is quantified.

QUANTIFICATION OF THE PREDICATE, in Logic: phrase introduced by Sir William Hamilton to express the characteristic feature of certain logical doctrines of his respecting the Proposition and the Syllogism.

According to the Aristotelian Logic, propositions are divided, according to their *quality*, into affirmative and negative ('The sun has set,' 'The sun has *not* set'); and, according to their QUANTITY, into universal and particular ('*All* men are mortal,' '*Some* men live 80 years'). If we combine the two divisions, we obtain four kinds of propositions—Affirmative Universal ('All men are mortal'), Affirmative Particular ('Some men live 80 years'), Negative Universal ('No man is omnipotent'), Negative Particular ('Some men are not wise').

Now, it is remarked by Sir William Hamilton, that the statement of the QUANTITY of these various propositions is left incomplete; only the *subject* of each has its quantity expressed (*all* men, *some* men, *no* men); while there is implied or understood in every case a certain quantity of the *predicate*. Thus, 'All men are mortal,' is not fully stated; the meaning is that all men are *a part* of mortal things, there being (possibly and probably) other mortal things besides men. Let this meaning be expressed, and we have a complete proposition to this effect: '*All* men are *some* (or part of) mortals,' where quantity is assigned, not only to the subject, but also to the predicate. It might be that the predicate contained under it only the subject, as in the proposition; 'All matter gravitates.' There is no other thing in the universe except matter that obeys the law of gravitation. Knowing this, we might quantify the predicate accordingly: '*All* matter is *all* gravitating things,' a kind of proposition not recognized in the old logic. Another original form of proposition, brought out by supplying the quantity of the predicate, is, '*Some* A is *all* B;' '*Some* men are *all* Englishmen.' So that, instead of two kinds of propositions under affirmation, Hamilton's system gives four. In the same way, he increases the number of negative propositions. 1. For 'No man is omnipotent,' he writes, quantifying the predicate, '*Any* man is not *any* omnipo-

tent;' or, '*All* men are out of *all* omnipotent things.' 2. 'Some men are not young' is fully quantified; 'Some men are not *any* young things;' 'Some men are out of *all* young things.' These two (in their unquantified shape) are the ordinarily recognized propositions of the negative class. To them Hamilton adds—3. '*All* men are not *some* animals.' 'All men are excluded from a certain division of the class animal;' and 4. '*Some* animals are not *some* men;' 'A portion of the animals is not included in a portion of men.'

The first result, therefore, of completing the statement of a proposition by inserting what Hamilton considers as implied in the thought—namely, the quantity of the predicate—is to give eight kinds of propositions instead of four. The next result is to modify the process called the Conversion of Propositions: see CONVERSE. The kind of conversion called *limitation* (All A is B, *some* B is A) is resolved into simple conversion, or mere transposition of premises without further change. 'All A is *some* B;' 'Some B is all A.'

The multiplication of varieties of propositions is attended with the further consequence of greatly increasing the number of *syllogisms*, or forms of deductive reasoning: see SYLLOGISM. In the scholastic logic, as usually expounded, there are 19 such forms, distributed under four figures (four in the first, four in the second, six in the third, five in the fourth). By ringing the changes on eight sorts of propositions, instead of the old number four, 36 valid syllogisms can be formed in the first figure. Whether the increase serves any practical use, is another question.

Hamilton considered also that he had been led, by the new system, to a simplification of the fundamental laws of the syllogism, or, as he expresses it, 'the reduction of all the *General Laws of Categorical Syllogisms* to a *Single Canon*.'

Prof. De Morgan, also, in his elaborate system of *Formal Logic*, has invented and developed into great detail a plan of expressing the quantity of the predicate; but he does not admit the whole of Hamilton's eight propositional forms, rejecting in particular the last mentioned in the above enumeration. He also increases the number of valid syllogisms as compared with the old logic. Not content with indicating that the predicate has quantity as well as the subject, he supposes the possibility of a *numerical estimate* of quantity in both terms of the proposition, and from this draws a new set of inferences. Thus, if 60 per cent. of B are included in C, and 70 per cent. in A, 30 per cent. at least of B must be found both in A and in C.—See Sir W. Hamilton's *Discussions;* Spencer Baynes's *New Analytic of Logical Forms;* De Morgan's *Formal Logic;* Mill's *Logic*, under the Syllogism; and his *Examination of Sir W. Hamilton's Philosophy.*

QUANTITY, n. *kwŏn'tĭ-tĭ* [F. *quantité*; L. *quantitas* or *quantitātem*, greatness, extent—from *quantus*, how great: It. *quantità*]: that property of anything capable of being increased or diminished; any indeterminate bulk, weight, or number; a large portion; an indefinite extent of space; an indeterminate mass or aggregate of matter; the measure of a syllable; in *logic*, a general conception; in *math.*, anything which can be multiplied, divided, or measured. QUAN'TITA'TIVE, a. *-tĭ-tā-tĭv*, or QUAN'TITIVE, relating to quantity; estimable according to quantity. QUAN'TITATIVELY, ad. *-tĭv-lĭ*.

QUANTUM, n. *kwŏn'tŭm* [L. *quantum*, as much as]: the quantity; the amount.

QUAQUAVERSAL, a. *kwā'kwă-vĕr'săl* [L. *quaqua*, wheresoever; *versus*, turned]: dipping on all sides; directed every way: in *geol.*, a term applied to the dip of the stratified rocks when arranged in dome-shaped elevations, or basin-shaped depressions, whereby the beds have an inclination on all sides to one point, that point being the summit of the dome in one case, and the lowest level of the basin in the other.

QUARANTINE, n. *kwŏr'ăn-tēn* [It. *quarentina*; F. *quarantaine*, forty—from L. *quadragin'ta*, forty]: time, originally 40 days, during which a ship arriving from a port or country where some malignant disease is raging—*e.g.*, yellow fever, cholera, or plague—must refrain from any communication with the shore: V. to compel a ship's company to forbear intercourse with the shore for a limited period on account of the real or supposed existence of some malignant disease on board. QUAR'ANTINING, *imp.* QUAR'ANTINED, *pp.* *Hist. Note.*—The ne plus ultra of mid. L. term *quarantina* was applied by the Anglo-Saxons about Egbert's time (according to a practice then prevailing of computing periods of time by forties) to an infected vessel coming from abroad, which was prohibited any intercourse with the shore for 40 days.—*Quarantine* is a protective measure, regarded as of such public importance that it is a high misdemeanor for any person in a quarantined vessel to come on shore, or for any one to disembark any merchandise or goods from her. The countries on the e. and s. shores of the Mediterranean are those usually supposed most liable to give infection; and, as a regular arrangement, ships from them have to pass quarantine at Malta, or some French, Italian, or Spanish port. In England, the Q. laws were, until recent years, enforced with severity; but now a Q. is unusual in that country though the power to enact it rests with the crown, and it is occasionally imposed by an order in council. In Mediterranean ports, Q. lasts ordinarily 6 to 15 days, though it sometimes extends to a much longer period, during which the passengers are imprisoned in a sort of barrack called a 'lazaretto,' and the contents of the ship—animals, goods, and letters—are fumigated, punctured, sometimes immersed in water, or even in acid, and all possible means are adopted to

destroy infection.—Quarantine is not limited to a sea-frontier; and it is enforced—often with absurd rigor—at the frontiers between contiguous states, especially in e. Europe, to the annoyance of travellers and the serious detriment of commerce.

An act of congress (1878, Apr. 29) forbids the entry to the United States of vessels from foreign ports where contagious and other diseases exist, excepting under prescribed regulations, as the object of Q. is to ascertain whether the crew and passengers of incoming vessels are infected or not, and as this inquiry is primarily of local importance, the federal govt. leaves to the several state govts. the prescribing and enforcing Q. regulations, and these are sustainable in courts of law as the exercise of the police powers of the states. The Q. officials of the states are known variously as Q. commissioners, boards of health, sanitary bureaus, etc. In cases of threatening local epidemics, as yellow fever, the health authorities, first of the locality and then of the state, establish Q. to prevent any infected person carrying the disease beyond the region thus isolated. The authorities of adjoining states also proclaim Q. against any person from the infected region, and can compel obedience with their police and milit. forces. Railroad trains and the mails can be stopped and subjected to thorough fumigation till all danger of infection is passed. If local and state authorities are unable to maintain adequate Q. and at the same time care for the sick, they may have the aid of the National Board of Health (see HEALTH, NATIONAL BOARD OF). Other aid may be had from the federal govt. in providing tents, hospital supplies, rations, disinfectants, etc., if the emergency is sufficient. New York has the most perfect Q. system in the world, established 1738, and consisting of a boarding-station at Clifton, Staten Island, summer boarding-station on the station ship anchored in the lower bay (4 m. below the Narrows), two artificial islands 10 m. below the city (Hoffman, 3½ acres, and Swinburne, 3 acres) containing reception hospitals and detention and disinfecting pavilions, burying-ground at Seguin's, Staten Island, small-pox hospital on Blackwell's Island, and typhus fever hospital on Ward's Island.—The federal govt., through the bureau of animal industry of the agricultural dept., maintains neat cattle Q. stations at the ports of New York, Boston, and Baltimore, for foreign receipts; and the states generally have provided for establishment of animal Q. whenever necessary.

History declares Q. regulations for maritime intercourse to have been established first by the Venetians 1127; but the practice must have been greatly older on land-frontiers; and the precautions of the Jews against leprosy indicate that a species of local Q. was enforced by them.

QUARE IMPEDIT, *kwā rē im-pē-dit:* title of an English action at law, whereby a person who has purchased an advowson, or right of presentation to an ecclesiastical benefice, sues any one who disturbs or hinders him in the exercise of his legal right.

QUARLES, *kwŏrlz*, FRANCIS: poet: 1592—1644, Sep. 8; b. Romford, Essex, England. He studied at Christ's College, took a law course at Lincoln's Inn, became cupbearer to the queen of Bohemia, was afterward sec. to Abp. Usher of Ireland, and 1639 obtained the office of chronologer of the city of London. In the troubles between the king and parliament he strongly sympathized with the crown. His estates, books, and MSS. were seized by the parliamentary officers, who subjected him to ill-treatment which he did not long survive. He was a prolific writer of both poetry and prose. Though often diffuse, his style was quaint and sometimes epigrammatic. Among his poetical works were *The Feast of Worms* (1620); *Divine Poems* (1630); *Divine Fancies* (1632); *Divine Emblems* (1635), and numerous elegies. His leading prose work was *Enchiridion* (1640). A few of his works have recently been republished.

QUARREL, n. *kwŏr'ĕl* [F. *querelle*, altercation—from L. *querēla*, complaint; Ger. *quarren*, to grumble: Fin. *karistu*, to speak in a high thin tone]: a petty fight or scuffle; an angry dispute; open variance between parties; ground of dispute; something that gives right to angry reprisal: V. to find fault; to fight or contend; to dispute; to disagree; to be at variance. QUAR'RELLING, imp.: N. dissension; strife. QUAR'RELLED, pp. *-ĕld*. QUAR'RELLER, n. *-ẽr*, one who quarrels. QUAR'RELSOME, a. *-sum*, disposed to quarrel; contentious. QUAR'RELSOMELY, ad. *-li*. QUAR'RELSOMENESS, n. *-nĕs*, disposition to engage in contention and brawls. QUARRELLOUS, in *OE.*, disposed to quarrel; petulant.—SYN. of 'quarrel, n.': difference; dispute; altercation; affray; fray; feud; broil; squabble; tumult; contest; contention.

QUARREL, n. *kwŏr'ĕl* [OF. *quarrel;* F. *quarreau*, a quarrel—from mid. L. *quadrellus*, a square tile, a quarrel: L. *quadra*, a square]: in *anc. archery*, square-headed arrow for a crossbow: a glazier's diamond. Quarrel or

Quarrel.

Quarry is a term also for a pane of glass of lozenge or diamond shape; also for a perforation or window of this form; also square or diamond-shaped paving-stones or tiles.

QUARRY, n. *kwŏr'ri* [F. *curée*; OF. *cuyerie*, the entrails of the game given to the dogs at the death—from L. *cor*, the heart: It. *corata*, the contents of the abdomen and thorax of an animal]: among *falconers*, any game flown at and killed; dead game.

QUARRY, n. *kwor'ri* [F. *quarrière*, *carrière*, a quarry—from *quarrer*, to cut square—from L. *quadrārĕ*, to cut square]: place where stones are excavated and roughly hewn: V. to excavate from a stone-mine. QUAR'RYING, imp. *-rĭ'ing*: N. act or business of digging stones from a mine. QUAR'RIED, pp. *-rĭd*. QUARRYMAN, n. one who works in a quarry. QUARRY-WATER, n. a familiar term among quarrymen and builders for the moisture contained in stone newly raised from the quarry, which gradually evaporates when exposed to the air.—*Quarry* is the excavation on the surface of the ground made in obtaining any useful rock. Quarrying differs little from mining in principle, except that the latter is essentially an underground operation.

From a very remote period, famous granite quarries were worked at Syene, and others of sandstone and limestone, along the banks of the Nile, for the temples and monuments of ancient Egypt. Greece found materials for white marble temples in the quarries of Mt. Pentelicus, near Athens, and in those of the islands of the Archipelago. It was from the quarries of Travertine (a kind of limestone), at Tibur, that ancient Rome was chiefly built. Italy has long been noted for marble quarries, those of Tuscany yielding the most esteemed kinds. The fine saccharoid marbles for statuary and other fine-art purposes are obtained exclusively from the Apuan Alps, around Carrara, Massa, and Seravezza. Those of Carrara, especially, are highly prized all over the world. From the quarries at Seravezza, marble to the value of $750,000, has been taken for the splendid cathedral of St. Isaac at St. Petersburg.

Notable quarries of the British Islands are those of Cornwall, Aberdeen, and Wicklow, for granite; those in the neighborhood of Edinburgh, Glasgow, and Newcastle, for sandstone; those near Bristol and Doncaster, and in the Isle of Portland, for limestone; those of Derbyshire, Devonshire, Kilkenny, and Galway, for marbles; and those of N. Wales and Argyleshire for slates.

In the United States the Q. industries are classified by kinds of rocks—as (1) marble and limestone; (2) sandstone; (3) crystalline silicious rocks; (4) slate. In 1880 there were 1,525 quarries of all kinds, which had $25,414,497 capital; 339 machines for quarrying, 2,290 for hoisting, 1,308 for dressing; 39,723 operatives of all grades; 9,979 horses, mules, and oxen; 4,606 wagons, vessels, cars, and locomotives; used explosives value $192,175; and had product 115,320,133 cubic ft. of all kinds, value $18,356,055. There were 616 marble and limestone quarries, with $10,565,197 capital and $6,856,-

681 product value; 502 sand-stone, $6,229,600 capital and $4,780,391 product; 513 cry-talline silicious, $5,291,250 capital and $5,188,048 product; 94 slate, $3,328,150 capital and $1,529,985 product. Io. had the largest number of marble and limestone quarries, 128.

The revised census reports of 1890 gave the following summary of the Q. industry:

Stone.	Quarries.	Capital.	Expenses.	Value of output.
Granite	874	$20,037,449	$11,564,021	$14,464,095
Marble	1[illegible]	12,062,842	2,675,069	3,188,170
Limestone	1,464	27,322,375	15,092,744	19,055,179
Sandstone	8[illegible]	15,777,967	8,250,255	10,816,057
Slate	27[illegible]	6[illegible],[illegible]57	608,582	1,089,606
Bluestone	222	13,[illegible]76,[illegible]56	2,762,122	3,182,513
Totals	4,9[illegible]	$[illegible],312,443	$40,772,812	$53,035,620

The value of grindstones produced was $139,587, distributed as follows: O., $130,398; S. D., $7,131; and Cal., $2,058; the millstone production was valued at $35,155, that of whetstones, $57,510, and soapstone, $231,708. Later productions are shown, for calendar years, as follows:

Stone.	1892.	1893.	States producing, 1893
Granite	$12,[illegible],[illegible]	$8,[illegible],[illegible]	26
Marble	3,[illegible],[illegible]	2,111,[illegible]	8
Limestone	18,[illegible],[illegible]	13,[illegible],[illegible]	37
Sandstone	8,[illegible],[illegible]	5,[illegible],[illegible]	31
Bluestone	1,[illegible],[illegible]	1,[illegible],[illegible]	3
Slate	4,[illegible],[illegible]	2,[illegible],[illegible]	9
Totals	$[illegible],[illegible],[illegible]	$[illegible],[illegible],[illegible]	

The decreased production was due to general business depression.

To understand the operations of the quarryman, it is necessary to bear in mind that all rocks belong to one or other of two great classes—the stratified and the unstratified. The stratified are sedimentary rocks, occurring in parallel beds or strata, and consist chiefly, so far as concerns the present subject, of sandstone and limestone. Unstratified or igneous rocks—e.g., greenstone or whinstone, granite, porphyry, etc., have no distinct bedding, that is, they do not lie in separate layers. Roofing-slate is a stratified rock, but it splits into thinner lamina in the direction of its *cleavage* than in the direction of its bedding, the former being often at right angles to the latter. Granite and other igneous rocks also have a natural jointage or cleavage, though they are not stratified. Advantage is taken of these peculiarities in quarrying the different rocks, but in the main the systems adopted do not greatly differ.

Stones are most frequently separated from their native rock by blasting with gunpowder: see BLASTING; also ELECTRICITY: SAFETY-FUSE. Of late the practice of boring jumper-holes with engine-power has been introduced, and, wherever it can be conveniently applied,

is a great improvement on the tedious process of boring by hand: see TUNNEL.

With some stratified rocks—e.g., sandstone—a good many of the best stones are procured without the aid of gunpowder. Hand-tools alone are used, because blasting is apt to cause rents, and otherwise shatter portions which it is desirable to keep solid. By this method, the quarryman makes a number of small holes with a pick, along a certain length of rock, into which steel wedges are inserted. After a succession of blows with heavy hammers, the wedges at length cut through the stratum. Blocks for columns, obelisks, tombstones, etc., are best procured in this way. Such blocks are obtained from those more valuable parts of sandstone deposits technically termed 'liver rock,' which consist of the thicker and more consolidated strata. Flagstones and other pieces of no great thickness are quarried from the thinner beds termed 'bed rock.'

When stones are removed in masses by blasting or otherwise, they have still to be quarried into shape, according to the purpose for which the various pieces are best suited. Thus, in an ordinary building-stone Q., the larger stones (after those of unusual size and quality are selected for the purposes named above) are roughly formed into ashlar, window-sills, lintels, rybats, corners, steps, and the like, by means of such tools as picks, hammers of various kinds, and wedges. The small irregular-shaped pieces are called *rubble*, and are used for the commonest kind of building. Slates are split into the thickness used for roofing, by means of a mallet and broad chisel. In granite quarries worked for paving-stones, the loss of material in reducing the blocks to the size and shape required, is enormous, as much as four-fifths of the whole being commonly wasted. Besides the tools already mentioned, long iron bars called *pinches*, and powerful cranes for turning and lifting the larger stones, are nearly all the implements required by the quarry-master.

In quarrying, as in mining, much of the cost is incurred for pumping water out of the workings. A good steam-engine and set of pumps are therefore indispensable for every Q. of any extent. Much expense is incurred from time to time also in clearing away sand, gravel, and other loose débris from the upper bed of the rock. This, called 'drift' by geologists, and 'tirring' in some localities by quarrymen, often becomes suddenly very deep, especially where the beds dip at a high angle, and is an obstacle by which many quarries of stratified rock are sooner or later arrested.

QUARRIES, in law, belong to the owner of the freehold or inheritance of the land, the maxim being, that the owner is entitled to the soil down to the centre of the earth. No person, therefore, is entitled to work a Q. or carry away the materials unless he derives his right from the owner by lease or other legal title, for the stones or materials are part of the soil.

QUART, n. *kwart* [F. *quarte*, a quarter]: a sequence of four cards in the game of piquet.

QUART, n. *kwawrt* [F. *quarte*; It. *quarta*, a fourth part, a quart—from L. *quartus*, the fourth]: measure of capacity, two pints, the fourth part of a Gallon (q.v.); also the vessel or measure which contains it. The word is nothing more than the common word 'quarter,' a fourth part.

QUARTAN, a. *kwawr'tăn* [L. *quartānă* (*febris*), the quartan ague—from L. *quartus*, fourth: It. *quartana*]: form of Ague (q.v.) occurring every third day. In numbering series, the Latins counted both the first and the last, so that the fever occurring every second day was called *tertian* (third), and that occurring every third day *quartan*.

QUARTATION, n. *kwawr-tā'shăn* [F. *quartation*, quartation—from L. *quartus*, fourth]: in an alloy of gold and silver, the separation of the gold from the silver by means of sulphuric acid, which dissolves the silver—the silver, however, must not be less than *three-fourths* of the alloy, otherwise the gold protects the silver.

QUARTER, n. *kwawr'tĕr* [F. *quartier*—from L. *quartārius*, a fourth part—from *quartus*, fourth: It. *quartiere*; Ger. *quartier*]: one-fourth part of anything: a weight of 28 lbs. avoirdupois (see below): measure of capacity of 8 bushels (see below): a point of the compass; a region; a territory; a particular portion or district of a town, city, etc.; proper station: in *mil.*, mercy granted by a conqueror to his enemy (see below): a part or side of a thing; the part of the side of a shoe from the heel to the vamp; the part of a ship's side toward the stern—its extent is arbitrary, but is held usually to comprise about one-fifth the ship's length: the fourth part of the year: one limb of a quadruped with adjacent parts: in *OE.*, friendship; amity; in *her.*, a subordinary consisting of the upper dexter fourth part of the shield, cut off by a vertical and a horizontal line meeting in the centre of the shield: see QUARTERING. QUAR'TERS, n. plu. military stations; lodgings or residence occupied by an officer or soldier; in the *navy*, the stations or positions assigned to every man on duty or in actual combat: in *building*, those slight upright pieces of timber generally about 4½ by 2 inches, placed 12 to 14 inches apart between the puncheons and posts, and used to lath upon. QUAR'TER, v. to divide into four equal parts; to separate into parts; in *mil.*, to be stationed at a place; to assign a lodging to a body of troops in a building or buildings; to fix on a temporary residence; to bear, as an addition to the hereditary arms. QUAR'TERING, imp.: N. in *arch.*, a series of quarters: in *mil.*, assignment of quarters: in *her.*, one of the divisions of a shield containing many coats (see below). QUART'ERED, pp. *-tĕrd*. QUAR'TERLY, a. *-lī*, consisting of a fourth part; done or held once every quarter of a year; relating to a quarter: AD. once in the quarter of a year: N. a periodical published at intervals of three months. QUAR'TERN, n. *-tĕrn*,

quarter of a pound; a tale of some goods, being a quarter of a hundred with one added; in parts of Britain, the fourth part of a peck; in liquid measure the fourth part of a pint, a gill. QUARTERN-LOAF, the 4-lb. loaf, so called because originally made of one-fourth of a peck, or rather of a stone, of flour. QUARTER-DAY, in *England*, one of the four days of the year, occurring every quarter, on which it is usual to enter or leave houses, and on which payment of rent or interest, etc., is due. QUARTER-DAYS, in *Eng.*, are *Lady-day*, Mar. 25—*Midsummer*, June 24—*Michaelmas*, Sep. 29—*Christmas*, Dec. 25; in *Scot.*, *Candlemas*, Feb. 2—*Whitsunday*, May 15—*Lammas*, Aug. 1—*Martinmas*, Nov. 11. QUARTER-DECK, in a *ship*, the portion of the upper deck abaft the mainmast (see below). QUARTER-FACE, a face three-fourths averted. QUARTER-FOIL, an ornament in Gothic arch. formed by a molding disposed in four segments of circles. QUARTER-GALLERY, in a *ship*, the projecting convenience and ornament of the top side connected with the stern. QUARTER-GUARD, the guard stationed at a little distance from the front of the centre of the camp of each corps. QUARTERMASTER, regimental staff officer charged with the duty of assigning quarters and providing food and clothing, etc., to his regiment (see below): in the *navy*, petty officer who assists the mates or master in their duties in stowing the hold, coiling ropes, attending the steerage, etc. QUARTERMASTER-SERGEANT, a non-commissioned officer who assists the regimental quartermaster. QUARTERMASTER-GENERAL, staff-officer whose duty it is to lay down the routes, to regulate the marches of the troops, and to assign them quarters, etc., (see QUARTERMASTER, below). QUARTER-PIECES, the carved figures at the aft part of the quarter-gallery. QUARTER SESSIONS, in *England*, a general court held quarterly by the justices of peace of each county for judicial and miscellaneous business, having important jurisdiction in all criminal matters except the class of highest crimes. It meets in the first full week after Dec. 28, Mar. 31, June 24, and Oct. 11, respectively—known as the Epiphany, Easter, Trinity, and Michaelmas sessions. QUARTER-STAFF, stout pole of heavy wood about 6½ ft. long, shod with iron at both ends; named from the manner of using it in attack or defense, one hand being placed in the middle, and the other between the middle and the end: it was formerly a favorite weapon with the English for hand-to-hand encounters. The attack was made by giving it a rapid circular motion, which brought the loaded ends on the adversary at unexpected points. QUARTER-ROUND, in *arch.*, any molding whose contour is a quadrant—called also an *ovolo*. HEADQUARTERS, the tent or residence of the commander-in-chief of an army, or of the commanding officer of a section of the army. ON THE QUARTER, in *nav.*, in the direction of a point of the horizon abaft the beam, but not quite in the direction of the stern. OUT-QUARTERS, the stations occupied by detachments at some

distance from the headquarters. To KEEP QUARTER, to keep within certain bounds, limits, or terms. To GIVE or SHOW QUARTER, to accept as prisoner an enemy in battle who submits; to forbear to kill a defeated enemy (see QUARTER, in War). To QUARTER ARMS, in *her.*, to place the arms of other families in certain compartments of a shield, the family arms being placed in the first (see QUARTER, in *her.*: QUARTERING, in *her.*).—SYN. of 'quarter, n.': district; locality; fourth; limb; encampment; division; region; territory; lodging; residence; shelter; entertainment.

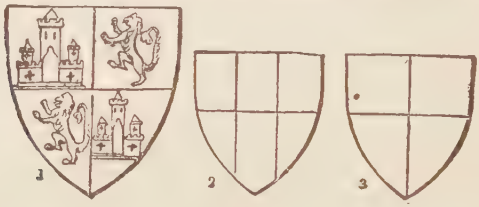
QUARTER: name of two measures in use throughout Great Britain and Ireland—one a measure of weight, the other of capacity. The former is denominated a quarter from its being the fourth part of a hundredweight, and contains 28 lbs. avoirdupois. The capacity measure of the same name contains 8 bushels, of 4 pecks each (see BUSHEL): it is said by some to have been so called from its being the fourth part of a 'chaldron,' but the quarter does not always bear this relation to the chaldron. As the porphyry coffer in the King's Chamber of the Great Pyramid (see PYRAMID) is said to be almost accurately the quadruple of the English quarter, the bold and doubtful theory has been advanced that this is the origin of the measure and the name (see *Our Inheritance in the Great Pyramid*, by Piazzi Smyth).

QUARTER, in War: the sparing of the life of a vanquished enemy, which by the old laws of war is forfeit to the victor. The expression seems to be derived from the use of the word 'quarter' to designate the lodging of the particular warrior; to *give quarter* to a prisoner being to send him to his captor's quarter for liberation, ransom, or slavery. The refusal of Q. is a terrible aggravation of the horrors of war, and is at all justifiable only toward an enemy who has been guilty of atrocious cruelty or of some flagrant breach of faith.

QUARTER-DECK of a Ship: an upper deck extending from the main-mast to the poop, or, when there is no poop, from the main-mast to the stern. It is used as a promenade by the officers only, and, in a ship-of-war, no person—officer or, otherwise—enters on it without touching his hat in token of salute. When the capt. addresses his men, or confers public distinction on any individual, the crew are summoned aft on the quarter deck.

QUARTERING, in Heraldry: the bearing of two or more coats on a shield divided by horizontal and perpendicular lines, a practice not found in the earlier heraldry, and little in use till the 15th c. Arms may be quartered for various reasons: 1. To indicate dominion; thus a sovereign quarters the ensigns of his different states. 2. Arms of augmentation or special concession accorded to a subject by his sovereign, by way of honor, are sometimes granted to be borne quarterly with the paternal arms. 3. The most usual reason for Q. is to

indicate descent from an heiress who has intermarried into the family. Where there is but one heiress, her coat occupies the second and third quarter of the shield, and the paternal arms the first and fourth. Where there are more than one, they are marshalled in the successive quarters in the order of the intermarriages. One of the quarters may itself be quartered, when the heiress



Quartering.

was entitled to bear a quartered coat; the shield is then said to be counter-quartered, and its primary quarters are called *grand quarters.*

The expression 'quarterings' is often loosely used for *descents* in cases where there is no right to quarter from representation. The 8 or 16 quarterings sometimes ranged round the Scottish funeral escutcheon, and which are still important for many purposes in Germany, have no reference to representation, but imply purity of blood for four or five generations; i.e., that the father and mother, the two grandmothers, and four great-grandmothers, as also in the case of 16 quarterings, the eight great-great-grandmothers, all have been entitled to coat-armor.

QUAR'TERMASTER'S DEPART'MENT IN THE U. S. ARMY: general staff dept. charged with the execution of all orders relating to the movement, quartering, and maintenance of troops. Thus the dept. provides for the marching, embarking, disembarking, billeting and cantoning of troops; for provisions, forage, and clothing; for making and repairing roads, milit. telegraph lines, railroads, and bridges; and for ammunition for the men, all supplies, and all means of transportation. The officers of the dept. 1896 were: 1 quartermaster-gen. with rank of brig.gen.; 4 asst. quartermasters-gen. with rank of col.; 8 deputy quartermasters-gen. with rank of lieut.col.; 14 quartermasters with rank of maj.; and 29 asst. quartermasters with rank of capt. There was also a milit. storekeeper with the rank of capt., and a regimental quartermaster (assisted by a quartermaster's sergeant) in each regt. The militia of each state has a similar dept. and officers. —In the U. S. navy the quartermaster is a petty officer, who, under the direction of the sailing master, attends to the helm binnacle, signals, and the storage of provisions and ballast.

QUARTERON, *kwawr'tĕr-ŏn*, or QUARTEROON, *-ĕr-ôn'*: see QUADROON.

QUARTET, n. *kwawr-tĕt'*, or QUARTETT, or QUARTETTE' [It. *quartetto*, a quartet—from L. *quartus*, the fourth]: musical composition in four parts, to be performed by four voices or instruments, in which all the parts are *obligati*, i.e., no one can be omitted without injuring the proper effect of the composition. Vocal quartets are usually accompanied by instruments to sustain the voices. A mere interchange of melody, by which the parts become in turn principal and subordinate, without any interweaving of them, does not constitute a quartet. Quartets for stringed instruments are arranged usually for two violins, a tenor violin and violoncello. The most famous quartets have been composed by Haydn, Mozart, Beethoven, Spohr, and Onslow.—The term is applied also to the four singers of such a composition.—Another application of the term is to a stanza of four lines.

QUARTIC, n. *kwâr'tĭk* [L. *quartus*, fourth]: in *alg.*, a homogeneous function of the fourth degree in the variables, or, as the latter are sometimes termed, facients. Binary, ternary, and quaternary quartics have been most studied, in consequence of their connection respectively with the theories of equations, of curves, and of surfaces.

QUARTILE, n. *kwawr'tĭl* [F. *quartile*, a quartile—from L. *quartus*, the fourth]: an aspect of the planets when distant from each other a quarter of a circle, or 90 degrees: see ASPECTS.

QUARTINE, n. *kwawr'tĭn* [L. *quartus*, the fourth]: in *bot.*, the fourth coat of the ovule, which is often changed into albumen.

QUARTLEY, *kwawrt'li*, ARTHUR: marine and landscape painter: 1839, May 24—1886, May 19; b. Paris, France. He was the son of an English engraver, Frederick William Q., who settled in New York. At the age of 11, his American life began, and his youth was passed in learning the sign-painter's trade, and in business in Baltimore. Having taught himself the art in which he became distinguished, he applied himself to it from 1873, residing in New York from 1875 until his death, just before which he spent a year in Europe. He became an associate mem. of the Acad. of Design 1879, and a full mem. 1886. His paintings exhibit richness, harmony, and power, and are highly valued. Among them are *Close of a Stormy Day* (1871); *From North River Pier-Head* (1878); *Trinity from the River* (1880); *Lofty and Lowly* (1884).

QUARTO, a. *kwawr'tō* [L. *quartus*, the fourth: It. *quarto*]: the fourth part of a sheet, or a sheet folded in four parts: N. a book consisting of sheets so divided: a book of a square or nearly square form; contracted into 4to: see PAPER.

QUARTO-DEC'IMANS: those who, after the final decision of the Council of Nicæa, continued to hold that it was obligatory on Christians to celebrate Easter on the 14th day of the first lunar month near the vernal equinox, *whether that 14th day fell on Sunday or not;* or who, even before the Council of Nicæa, held the observance of the Jewish Passover to be of obligation. For the controversies as to the celebration of Easter, see EASTER.

QUARTZ, n. *kwawrts* [Ger. *quarz*, a name formerly given to crystals forming in the earth]: name of numerous varieties of rock-crystal, or of crystallized silica, known under the various names *rock-crystal, amethyst, siderite, topaz, cairngorm, milk-quartz, rose-quartz*, etc. QUARTZIFEROUS, a. *kwawrts'if-ĕr-ŭs* [L. *fero*, I produce]: in *geol.* composed of quartz, or largely containing quartz. QUARTZITE, n. *kwawrts'īt*, also termed QUARTZ-ROCK, an aggregation of quartz-grains—applied to sandstones which have been indurated or altered by heat and infiltrated by silicious cement. QUARTZ'OSE, a. *-ōs*, QUARTZOUS, a. *-sŭs*, and QUART'ZY, a. *-sĭ*, abounding in quartz, applied to sands, sandstone, and grits, essentially composed of quartz.—*Quartz* is essentially *Silicic Acid*, or *Oxide of Silicon* (see SILICON), though it is often combined or mixed with other substances. It is very abundant and widely diffused. It is almost the sole constituent of quartz rock, in which gold is far more frequently found than in any other matrix; and it is a principal constituent of granite, syenite, protogine, eurite, pegmatite, granulite, elvanite, all the different kinds of sandstone, and many other rocks. It is also a common mineral in trap-rocks, limestone, etc., and the sands of the sea-shore and of deserts are chiefly formed of it. It is found both massive and crystallized; the primary form of the crystals is a rhomboid, but it far more frequently occurs in six-sided prisms, terminated by six-sided pyramids; or in six-sided pyramids; or sometimes in dodecahedrons, formed by six-sided pyramids base to base. It is hard enough to scratch glass easily, and it gives fire when struck with steel. It becomes positively electrical by friction; and two pieces, rubbed together, give light in the dark. When pure, it is quite colorless; but owing to the presence of foreign substances, it often exhibits great variety of colors; and many minerals, known by different names, and consisting chiefly of Q., have little or nothing to distinguish them but their color. Thus Rock Crystal, Chalcedony, Carnelian, Cairngorm, Agate, Amethyst, Prase, Chrysoprase, Jasper, etc., are mere varieties of Q. Opal (q.v.) is very nearly allied to it.

Quartz Rock, or Quartzite, is a sedimentary sandstone, converted into a very hard, compact rock by metamorphic action. It is distinctly granular; the grains, however, seem to melt into each other, or to be enveloped in a homogeneous silicious paste. It is frequently brittle, and in weathering, it breaks into small irregular cubes.

Quartz Veins occur in metamorphic rocks. The

structure of the veins is compact and homogeneous, and very different from that of quartzite. Veins not only differ in width, but the same vein is very variable throughout its course, sometimes thinning to a very fine film, and then swelling out to great thicknesses. Q. veins are more metalliferous than the mass of the rocks in which they occur. They are the principal natural repositories of gold, for though the precious metal is obtained chiefly from alluvial sands and gravels, these are the weathered and abraded fragments of the underlying, or neighboring Palæozoic rocks. In the Brit. colony of Victoria, the great veins are so highly auriferous, that they are mined for gold. Wherever the Lower Silurian rocks make their appearance on the surface throughout the colony, they are everywhere intersected by enormous numbers of Q. veins, which often reach a thickness of 10 to 15 ft. As yet only a very small proportion of these have been explored: but the results have been so remunerative, that mining in the solid rock for gold is extensively pursued. One mine has been driven to a depth of 400 ft. and, contrary to the general opinion, the vein at this depth continued to be auriferous.

In N. America, as elsewhere, the noted localities of cabinet specimens of the many varieties of Q. are numerous. Many of the limpid crystals, known as rock crystal, came from *débris* or pockets of the calciferous sandrock of Little Falls, N. Y., and from Diamond Point and Island, Lake George; beautiful masses of implanted clear crystals from the Ellenville lead mine, Ulster co., N. Y.; other localities are the mines in Jefferson and St. Lawrence cos., N. Y.; and Waterbury, Vt., furnished a crystal 2 ft. long, 1½ ft. diam., 175 lbs. in weight. Many fine specimens have been brought from mines in the far west—e.g., Calaveras co., Cal. Rare crystals, much modified by hemihedral planes, were found in syenite quarries in Mass., and rhombohedral forms have occurred in Jasper. The smoky or cairngorm variety (the color ascertained to be due to a substance containing carbon and nitrogen, supposed to be organic) occur in Nova Scotia; Paris, Me.; Lake Superior; Chester, Penn. (one weighing 7 lbs.), and especially in the Pike's Peak region. Elegant rose Q. comes from Paris, Me.; Ackworth, N. H.; Essex co., N. Y. and other places. Crystals of amethyst in large splendid groups have been abundant at Lake Superior; and they sometimes line hollow trunks of the silicified wood that abounds in the s. Rocky Mt. region, where also large solid trunks of beautifully agatized wood abound. Small agates are plentiful around Lake Superior, some exquisite when polished, and are found in the glacial drift from that source for hundreds of miles in the prairie region. The large polished agates sold in the far west as Rocky Mt. specimens (many of them with black bands produced by boiling in oil, then soaking in sulphuric acid) are mostly from S. America, polished in Germany. Fine moss-agates are plentiful in Wyoming. Jasper, of various colors, is frequent in the

metamorphic regions, notably n. of the great lakes, chalcedony also, especially as coating the grape-like (botryoidal) lining of geodes in various localities, particularly the magnificent geodes that give name to a sub-carboniferous bed exposed along streams in s. Ill. and Io. and n. Mo.; the geodes are usually lined with Q. crystals. Bloomingrove, Orange co., N. Y., has furnished heliotrope. Opal, of the same composition as Q., but differing in hardness and specific gravity, occurs as brilliant fire-opal in Washington co., Ga., and in Mexico: as silicious sinter it collects around some of the western hot-springs; and as tripoli, made up of microscopic skeletons, is found in Va., Cal., and elsewhere. The 'Mexican Onyx,' of great beauty, used for mantels and furniture, is not true onyx, which is Q. On the New Eng. mountains, drift blocks of milky Q. are in places so common that stone fences are largely built of them. Q., the great cement of nature's masonry, and no less her great grinding material (the silicon in it alone making ¼ of the mass of the earth's crust) is so common itself and as combined in the numerous silicates, that more than half of every cabinet of minerals and book of descriptive mineralogy in made up of silica and its compounds.

QUASH, n. *kwŏsh:* a species of pumpkin; the Amer. *squash*, which see.

QUASH, v. *kwŏsh* [OF. *quasser;* F. *casser*, to crash in pieces, to annul—from L. *quassārĕ*, to shatter or shiver; *quatĕrĕ*, to shake: Ger. *quetschen*, to crush, to bruise—an imitative word]: to crush; to subdue suddenly; in *law*, to annul or make void; to suppress. QUASH'ING, imp. QUASHED, pp. *kwŏsht.*

QUASI-, prefix, *kwā'sī* [L. *quăsĭ*, as if, as it were]: not the real thing, though accepted in its stead; apparently; almost; of the same import. QUASIMODO, n. *kwās-ī-mō'dō* [L. *quăsĭ*, as if; *modo*, only, merely]: in the *Rom. Cath. Chh.*, the first Sunday after Easter, so called from the *introit* for that day (I Pet. ii. 2) of the mass commencing with the words *Quasi modo.* It is called also DOMINICA IN ALBIS, from the ancient custom of the neophytes who had been baptized at Easter appearing in white garments in the church.

QUASS, n. *kwăs* [Russ. *kwass*]: a sharp, acid, and often muddy liquor made by fermenting rye-meal in warm water, and sometimes a mixture of barley-flour; rye-beer, a favorite Russian drink, which, when it becomes too sour, is used as vinegar.

QUASSIA, n. *kwŏsh'ĭ-ă* [said to be named after a negro named *Quassi*, who discovered its medicinal qualities]: genus of trees and shrubs of nat. order *Simarubaceæ* (q.v.), having hermaphrodite flowers, with five petals combined into a tube and much longer than the small calyx, ten stamens, five germens, and only one style; the fruit composed of five drupes. *Q. amara* is a native of tropical America, and of some W. India islands. It is a shrub 10–15 ft. high, with racemes of bright-red flowers, and large pinnate leaves, whose stalks are remarkably winged and jointed. The wood, particularly of the root, has a very strong bitter taste, and has been much used in medicine under the names *Q.-wood*, *Bitterwood*, etc. The flowers were valued in Surinam for stomachic properties, as early as the beginning of the 18th c.; the wood of the root began to be known in Europe before the middle of that century, and was more fully brought into notice about 1756, by Rolander, a Swede, who had visited Surinam, and had learned its value from a negro, called Quassi, or Quassia. This negro had employed it with great success as a remedy for fevers, and had acquired great reputation by the use of it. Linnæus published a dissertation on it 1763, and it was he who gave to the genus the name Quassia, from the discoverer of its qualities. The true Q. is now, however, little used; its name having been transferred to the Bitterwood (*q.v.*) of the W. Indies. *Picræna* (or *Simaruba*) *excelsa*, a lofty tree, whose wood possesses the same properties, though in inferior degree; but this inferiority is compensated by the greater facility with which any requisite supply is obtained. The wood of this tree is now sold as *Q.-wood*, or *Q.-chips*, in the shops. It is used to some extent instead of hops for making beer, though beer made with it is said to become muddy and flat, and not to keep. Q.-wood is narcotic, and a decoction of it is used for killing flies. Cabinet-work made of it is safe from attacks of insects. In medicine, it is a valuable tonic; but in fevers, it is not to be compared with Peruvian bark and its alkaloids. QUASSIN, n. *kwŏs'sĭn*, or QUAS'SITE, n. *-sīt*, the bitter principle of quassia.

Quassia amara.

QUATERNARY, a. *kwă-tĕr'na-rĭ* [L. *quaternarĭus*, containing four—from *quater'ni*, four each—from *quat'ŭor*, four]: consisting of fours: in *bot.*, arranged in fours, as a leaf: in *geol.*, denoting all accumulations above the true tertiaries, equivalent to post-tertiary strata (see below): N. the number four. QUATER'NATE, a. *-nāt*, in *bot.*, applied to leaves coming off in fours from one point. QUATERNARY COMPOUND, a body composed of the four elements—carbon, hydrogen, oxygen, and nitrogen—characteristic of the tissues of animals.

QUATERNARY, *kwâ-tĕr'na-rĭ* [L. adj. four]: geological age, otherwise known as Post-tertiary or the Era of Man. It is the term most frequently used, though, like Tertiary, it conforms to the names Primary and Secondary, which were employed in a confusing way for more or less of the anterior series of rocks, and are now nearly obsolete. Le Conte uses the term Psychozoic (referring to man), in harmony with a terminology suggested by Phillips and now much employed, viz., Eozoic (or Azoic or Archæan = pre-fossiliferous-primary), Paleozoic (= fossiliferous-primary), Mesozoic (= secondary), and Cenozoic (Kainozoic of Brit. authors = tertiary, and also quaternary, unless the latter be separated as psychozoic).

The Q. in N. Amer. is divided into three periods: Glacial, Champlain, and Terrace or Recent.—1. The Glacial: known also as the Drift, because the deposits of this period consist of confused gravel, bowlders, sand, and clay—the coarser material traceable to rocks of the same character at a greater or less distance, and therefore transported, but not deposited in layers or strata, and consequently not by the agency of water as the prime cause. These facts, together with the planing of many bowlders, the planing and grooving of underlying rock, the parallelism of the grooves over hundreds of miles (this corresponding with the source of the bowlders), the existence of moraines outlining the stages and s. extensions of a great system of glaciers, are the sufficient proofs of a Glacial Period. The drift in many places has been re-arranged in finer or coarser layers, called modified or stratified drift; but this was mostly the work of the Champlain Period. The principal terminal moraine runs westward through Long Island, N. J., Penn., deflected n. into w. N. Y., then down through O., crossing the Ohio river for a short distance, then returning and passing through Ind. and Ill., but soon repeating itself brokenly to the n.w. as the ice successively retreated and advanced. Thus the s. extension of the glaciers has been traced. Instead of one great ice-cap centring at the Pole, the striation and other phenomena indicate many centres in N. Amer., the chief along the course of the old Azoic nucleus of the continent, as thus far determined. There were local glaciers in the s. Alleghanies and in the Rocky and Pacific border mountains; and some bowlders were carried far s. by floating ice. Similar phenomena are observed in S. America, in parts of New Zealand, and in n. Europe, where, however, owing to the broken nature of that region the glaciers were more local, radiating from mountain centres. Additional phenomena are the fiords, plowed by glaciers on the n.w. coasts of Europe, and the n.e. of N. Amer. The cause of the glaciation is believed to be the elevation that, proceeding by great uplifts in the Tertiary, was continued in high latitudes, accompanied there by a great increase of continental breadth; an uplift of 5,000 ft. above the present

average in those latitudes is supposed to have been enough to produce the results. From numerous data and computations by Amer. geologists, the end of the Glacial Period is now placed about 7,000 years since (see ANTHROPOLOGY). For its beginning, the data are lacking, it having been shown that atmospheric conditions may have neutralized all those which depend on calculations from astronomy.

2. The next or CHAMPLAIN Period is named from deposits on Lake Champlain. It was an era of general subsidence in high latitudes, even much below present altitudes, and of increasing depression northward, as shown by the vast filling in of basins and channels scooped by glaciers or pre-existing—the filling now revealed by the subsequent cutting down during the Terrace Period, when there was another elevation. Old sea, river, and lake beaches and borders now can be seen much above the present level of the waters; e.g., s. New Eng. 40–50 ft., Me. 217, Bay of Fundy 350–400, Labrador 400–600, Arctic localities 1,500; Lake Erie 220 ft., Lake Huron 400, Lake Champlain 350–400 ft., and there the skeleton of a whale found 60 ft. above lake level; on e. rivers a similar increase amounting to 500 ft. at Montreal; on w. rivers likewise. The depression was such that the flood-plains of rivers were of great width; many old channels were so filled that new courses were formed; and the Great Lakes were probably one immense lake, discharging into the Mississippi, which, below the Ohio, was 50–75 m. broad, as indicated by the old bluffs. The subsidence had brought on an era of warmth; the glaciers retreated, and, finally rotten, dissolved rapidly, throwing down their vast loads of *débris*, which were swept by the deluge into every depression or channel, and left in sometimes unstratified confusion (a diluvian epoch, plainly exhibited); or, in the latter and quieter part of the period (the alluvian epoch), worked and sorted over, and covered with beds of fine silt. The flood epoch, however, had its localities of quiet sediment, and, in its beginning, a lacustrine or fluvial clay deposit, often finely laminated, known as Champlain or Erie clays; these, in the Connecticut valley are the beds where curious 'clay-stones' were afterward formed by concretionary action. The bowlder-clay, distinguished from that now mentioned, was deposited during the entire progress of the glaciers, but may have continued after the melting began, with no universal dividing line from the Champlain clays. The *loess* of the west is referred to the last of this period, but there is a difference of opinion in regard to the conditions of its production. The entire series of phenomena thus sketched have their counterpart in Europe. For simplicity's sake, reference is here omitted to such questions of detail as interglacial epochs, having something of the character of the Champlain on a smaller scale.

3. The TERRACE, or Recent Period, has necessarily

been referred to in speaking of the evidences of the Champlain, following which period came elevation and refrigeration. No further supply of water and transported material was furnished by glaciers; and the elevation increased the pitch of flowing streams, which cut down deeper and deeper into the accumulations above described, leaving successive terraces along rivers as the waters decreased in volume: the same result ensued on the lessening of the lakes; and, owing to the rising of the mainland, on the sea-coasts. A terrace on the s. side of Lake Ontario formed a natural roadway, and was known as the Ridge Road. Offsets of many different levels are seen on the Connecticut river and elsewhere. In fact, we are living in the continued Terrace Period; many rivers are cutting deeper, especially in their upper courses, and there seems to be still a slow general rising in high n. latitudes, very marked in some localities, with exceptions in others. Since the beginning of the period, the continent has gained in extent, rivers have dwindled, some eastern lakes have disappeared or left only swamps, and the lakes of the great western plateau have vanished or become comparatively insignificant. In Europe the terraces and other facts are manifest; e.g., the 'benches' of Glen Roy (q.v.), in Scotland, 847, 1059, and 1,139 ft. above tide-level.

There was, however, an interruption to a limited extent on both continents, known as the Reindeer or Second Glacial era, preceding the Modern era proper—the two being subdivisions of the Terrace or Recent. Some time in the course of the period, the elevation went so far above its present height that the reindeer migrated s. to N. J. and to France; the glaciers of the Alps extended over all lower Switzerland. Other facts point to the same temporary refrigeration, hardly comparable to the Glacial Period.

Coming to the life of the Q., it may be noted that the Glacial Period extinguished many plants and animals, or forced them southward and brought with it species of the far north, some of which, on the retreat of the ice, were left as survivors to this day on mountains of the United States—e.g., 37 Alpine plants and an Alpine butterfly on the White Mts.; a Greenland sandwort there and on the Catskills; and an Alpine club-rush on Roan Mt., N. C. The plants and invertebrates of the Q. almost all are living species, but the mammals nearly all are extinct. N. America did not equal Europe in carnivores, but had its monsters. It had two species of elephant; the largest known mastodon and horses; a beaver two-fifths larger than the living; a bison much exceeding the recent; a stag equal to the fossil Irish deer; a lion not inferior to the great extinct Brit. one; and species of the great Megatherium, Mylodon, and Megalonyx, which doubtless immigrated from the land of giant edentates, s. Amer., in this period. Remains of these various animals are found in caves, fissures, marshes, and soils. In central Iowa abundant bones of

the mammoth (with teeth of different ages, and intermediate between *E. Americanus* and *E. primigenius*) were found in a space of many square rods, 6–8 ft. beneath the prairie surface, but all confusedly scattered, as if the animals had followed a slowly retreating glacier, been overwhelmed, and brought rather decomposed and dismembered to where they stranded there. In European caverns, many remains of gigantic bears, tigers, bears, hyenas, etc., have been found; and species of mammoth, rhinoceros, hippopotamus, etc., abounded. The cold of the second glacial condition seems to have come on suddenly, enfolding Siberian mammoths in ice. Australia had gigantic forerunners of its peculiar marsupials, but the gigantic extinct birds are believed to have continued to a comparatively quite recent time.

There is no certain evidence as yet that man appeared before about the close of the Glacial Period, and it is certain that he was contemporary with many of the extinct monsters mentioned. Preceding the Iron Age and the Bronze Age (q.v.), the Stone Age (q.v.) is divided into the Paleolithic era, or that of rough implements; the Reindeer, with knives, pins, etc., made from the bones of that animal: and the Neolithic, or that of polished stone implements.

QUATERNION, n. *kwă-tĕr'n-ŏn* [L. *quater'ni*, by fours]: a set of four parts, objects, or individuals; in *Scrip.*, a file of four soldiers.

QUATER'NIONS: metagraphic relation which exists between any two right lines having definite lengths and directions in space; one of the most remarkable of the mathematical methods or calculi, which have so enormously extended the range of analysis, while simplifying its application to the most formidable problems in geometry and physics. Its inventor was Sir William R. Hamilton.

Not attempting to give a complete elementary analytical view of this calculus, we endeavor, by means of elementary geometry and algebra alone, to indicate its nature and value. For this purpose, it will be necessary to consider some very simple, but important, ideas with reference to the *relative position* of points in space. Suppose A and B to be any two stations, one, for instance, at the top of a mountain, the other at the bottom of a coal-pit. *Upon how many distinct numbers does their relative position depend?* This can be easily answered thus: B is so many degrees of longitude e. or w. of A, so many degrees of latitude n. or s. of A, and so many ft. above or below the level of A. THREE numbers suffice, according to this mode of viewing the question, to determine the position of B when that of A is given. Looking at it from another point of view, suppose A to be the earth, B a fixed star. To point a telescope at B, we require to know its altitude and azimuth, its latitude and longitude, or its right ascension and declination. Any of these pairs of numbers will give us the *direction* of the line AB, but to determine absolutely the position of B, we require a *third* number—viz., the length of AB. Hence, it appears that any given line AB, of definite length and direction, is completely determined by *three* numbers. Also, if the line *ab* be parallel and equal to AB, it evidently depends on the same three numbers. Hence, if we take the expression (AB) to denote (*not*, as in geometry, the length of AB merely, but) the length and direction of AB; we see that there will be no error introduced, if we use it in the following sense:

$$A + (AB) = B;$$

i.e., if, beginning with A, we take the step represented by (AB), we shall find ourselves at B. From this it follows at once that, if C be any third point,

$$A + (AB) + (BC) = C;$$

i.e., beginning at A, and taking the successive steps (AB) and (BC), we are finally brought to C. But we have also

$$A + (AC) = C,$$

by taking the step from A to C at once. Hence, with the present signification of (AB), etc., we see that

$$(AB) + (BC) = (AC),$$

which shows that lines, *when their length and direction are both considered*, are to be added or compounded according to the same law as velocities or forces: see COMPOSITION OF FORCES. In this sense, a line is called by Hamilton a *Vector*.

Again, we have evidently

$$A + (AB) + (BC) + (CA) = A,$$

because the three successive steps bring us back to the starting-point. Hence

$$(AB) + (BC) = -(CA),$$

and therefore $(AC) = -(CA)$, or the sign (only) of a vector is changed if its direction be reversed.

The rules for the addition, and therefore for the subtraction, of vectors are thus extremely simple; and, without any further preface we are in a position to solve a great many geometrical problems, some of unusual difficulty. A comparatively simple one must suffice; let us prove Euclid I. 33; i.e., if AB be parallel and equal to CD, AC is parallel and equal to BD. In vectors, given $(AB) = (CD)$, prove $(AC) = (BD)$. We have at once, by going directly from A to C, and then by the course A, B, D, C,

$$(AC) = (AB) + (BD) + (DC).$$

But $(AB) = (CD) = -(DC)$ by what we have just proved. Hence the first and third terms of the expression for (AC) are equal and of opposite signs, and therefore

$$(AC) = (BD).$$

This example, chosen from its simplicity, gives an extremely inadequate idea of the grasp which vectors take in common geometry.

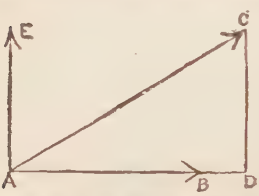
So far, we have not advanced much beyond common geometrical methods: but we *now* come to the step in which quaternions proper are introduced, a vector being merely a degraded species of quaternion. This new step contains Hamilton's answer to the question, answered over and over again during the last 50 years in forms of the most uncouth complexity, '*How to express the product, or the quotient, of two vectors, or directed lines.*' In other words, keeping to one part of the question only, what is the nature of the factor q in the equation

$$(AC) = q(AB),$$

where A, B, C are any three points?

Let us first consider *on how many independent numbers does it depend?* It might at first sight appear to depend on *six*, for (AB) and (AC), as we have already seen, each contain *three*. But let us analyze the process of passing from the one vector to the other, much as we have already analyzed the vector step of passing from one

point to another. To simplify the idea of the process, let us suppose it to be affected by a species of rotation. First, then, in order that (AB) may be turned so as to coincide in *direction* with (AC), it must be turned about an axis perpendicular to the plane of the triangle ABC, and through an angle BAC. Now, the *direction* of a line depends on *two* numbers, as we have seen above; hence we have *two* for the direction of the axis, and *one* for the angle through which AB is turned. But AB and AC are not, in general, of equal length; hence, after their directions have by turning been made coincident, AB must be compressed or stretched till its *length* is the same as that of AC. Thus, a *fourth* number is required for the complete description of the process, and therefore q depends upon *four independent numerical quantities*; hence its name, quaternion. A similar investigation, but somewhat less elementary, shows that the *product* of two vectors also depends on four distinct numbers. This will be proved analytically further on in the article.



Now, suppose AB and AC to be *equal* to each other, and at right angles; and suppose

$$q(\mathrm{AB}) = (\mathrm{AC});$$

i.e., suppose that q turns AB through a right angle in a given plane, without altering its length. Apply the operation, denoted by q, a second time, and we have

$$q \,.\, q \,.\, (\mathrm{AB}) = q(\mathrm{AC}).$$

Now q(AC) must represent a vector equal to AC in length, but turned through a right angle, in the plane BAC. It must therefore be in the direction of BA produced through A, and equal in length to AB. Hence, by a previous remark, it may be expressed by

$$-(\mathrm{AB}), \text{ or by } (\mathrm{BA}).$$

Hence, $q \,.\, q(\mathrm{AB}) = -(\mathrm{AB})$, or $q \,.\, q = -1$.

The particular quaternion, therefore, which turns a vector through 90° without altering its length, has its square equal to -1. Though, of course, they are essentially a real geometrical conception, this result shows how closely quaternions are connected with what are called Imaginary Quantities (q.v.) in analytical geometry and algebra.

Now, it is found by a careful examination of all the consequences involved, that we are at liberty to represent by a vector of unit length, perpendicular to the plane of two equal lines at right angles to each other, the quaternion which, employed as a multiplier, changes one of these lines into the other. This result we must assume; as its proof, though not in any sense difficult, would require the free use of analytical symbols to con-

dense it within our assigned limits. Hence, three vectors, each of unit length, and each perpendicular to the other two, have the property that the product of any two, taken in the proper order, is the third. For illustration, suppose these to be drawn eastward, northward, and upward, and let them be represented (according to Hamilton's notation) by i, j, k respectively; we have the following equations among them:

$$i.j = k,\ j.k = i,\ k.i = j;$$

where it is to be observed that the *order* of the alphabet is maintained throughout. Also, as before, we see that $i^2 = j^2 = k^2 = -1$.

Considering them, for a moment, as handles to be laid hold of to turn the whole system about one of them, we see that i turns j into the position of k; that is, the operation i may be effected by a left-handed quadrantal rotation about the eastward line i. What, then, is the result, on the vector i, of the rotation symbolized by j? Laying hold of the northward line j, use it as an axis of left-handed quadrantal rotation, and the effect on the system will be not only (as above, $jk = i$) to make the upward line an eastward one, but to make the eastward line a *downward* one; in symbols,

$$j.i = -k.$$

Comparing this with

$$i.j = k,$$

we see that in quaternions, *the Commutative Law of Multiplication does not hold;* i.e., that the product depends not only on the factors, as in arithmetic and algebra, but also on the *order* in which the multiplication is effected. This is, of course, a little perplexing to the beginner, but is easily surmounted; and the mere consideration of this fact is often sufficient for the proof of theorems regarded in general as of no ordinary difficulty.

For further information, we must refer the reader to Sir William R. Hamilton's *Lectures on Quaternions*, and to his *Elements of Quaternions*. Some elementary information may be derived also from papers by Kelland and Tait in the *Quarterly Messenger of Mathematics*, and the *Quarterly Mathematical Journal*.

QUATERON, n. *kwâ'tĕr-ŏn :* a quadroon, which see.

QUATORZE, a. *kâ-tawrz'* [F. *quatorze*, fourteen; It. *quattordici* from L. *quatŭor'dĕcim*, fourteen—from *quat'ŭor*, four; *dĕcem*, ten]: fourteen: N. four cards at the game of piquet, so called because each quatorze reckons fourteen points.

QUATRAIN, n. *kwŏt'rān* or *kâ'trān* [F. *quatrain*, a quatrain—from *quatre*, four—from L. *quat'ŭor*, four]: in *poetry*, a little poem of four lines, usually rhyming alternately; sometimes four verses (lines) of a longer poem, such as a sonnet, if they form a complete idea within themselves. Epigrams, epitaphs, proverbs, etc., are often expressed in quatrains.

QUATRE-BRAS, *kâtr-brâ'* [Fr. Four Arms]: village of Belgium, province of S. Brabant, about ten m. s.s.e. of Waterloo; at intersection of the great roads from Brussels to Charleroi, and from Nivelles to Namur, whence its name. 1815, June 16, two days before the battle of Waterloo, Q. was the scene of a desperate and sanguinary battle between the English under Wellington and the French under Ney. The honors of the field remained with the former; but the severe defeat of Blücher the same day at Ligny rendered Wellington's hard-won victory almost valueless; and foreseeing that it would be impossible for him to maintain his position, the English commander retired next morning through Jemappes to Waterloo, in order to keep up his communication with the Prussian army. The loss of the English and their allies at Q. was in all 5,200; that of the French, though beaten, amounted only to 4,140. This is accounted for by the fact that, during the greater part of the engagement, the English had no cavalry (for the Belgian horse galloped off the field without striking a blow) and no artillery.

QUATREFOIL, n. *kâ'tr-foyl;* another spelling of *quarterfoil* [F. *quatre*, four; *feuille*, a leaf or blade]: in *arch.*, an opening in tracery, a panel, etc., divided by cusps or foliations into four leaves; the leaf-shaped figure formed by the cusps—this form is usual in Gothic architecture: in *her.*, four-leaved grass.

QUATREMÈRE, *kâtr-mār'*, Etienne Marc: French orientalist: 1782, July 12—1857, Sep. 18; b. Paris. From his earliest childhood to his latest years, he was immersed in abstruse studies, and lived after the fashion of a mediæval recluse. Employed 1807 in the MS. dept. of the *Bibliothèque Impériale*, he was promoted 1809 to the Greek chair in the College of Rouen, and 1819 to the chair of ancient oriental languages in the Collége de France. In 1827 he became prof. of Persian in the School for Modern Oriental Languages. Q.'s erudition was enormous; but, according to Ernest Renan (one of the first modern orientalists), he was strikingly deficient in critical insight and in genius for sagacious and luminous generalization. But in less delicate fields he is

safe. His historical and geographical memoirs are of incalculable value. Q.'s principal works are—*Recherches sur la Langue et la Littérature de l'Egypte* (Par. 1808), in which it is shown that the language of ancient Egypt is to be sought in the modern Coptic; *Mémoires Géographiques et Historiques sur l'Egypte* (Par. 1810); *Histoire des Sultans Mamelouckes* (Par. 1837), from the Arabic of Makrizi; *Histoire des Mongols de la Perse* (Par. 1836), from the Persian of Rashid-Eddin; and his ed. of the Arabic text of the Prolegomena of Ibn-Khaldun, one of the most curious monuments of Arabic literature. Besides these, a multitude of valuable articles are in the *Journal Asiatique* and the *Journal des Savants*.

QUATTROCENTIST, n. *kwat'rō-chĕn-tist:* painter of the Quattrocento school: ADJ. belonging to, or characteristic of the Italian painters of the 14th century.

QUATTROCENTO, n. *kwat'rō-chĕn-tō* [It. *lit.*, four hundredth, but used for fourteen hundredth]: term applied to the characteristic style of artists in the 14th c.; it was hard, rigid, and peculiar in color, as well as in form and pose. It was the intermediate stage of that progressive period of art, which, commencing with Fra Angelico, reached excellence with Leonardo da Vinci.

QUAVER, v. *kwā'vĕr* [Ger. *quabbeln*, to shake like a jelly: Dut. *quabbe*, a dewlap, from its quavering movement: Sp. *quiebro*, a quaver, a movement of the body]: to tremble; to shake; to vibrate; to speak tremulously; in *music*, to produce a note with a tremulous modulation of the voice: N. rapid vibration of the voice: in *music*, a note of very short time, whose measure is equal to half a crotchet, one-fourth of a minim, or one-eighth of a semibrieve. It is represented thus:

or when two or more are conjoined, thus:

QUA'VERING, imp.: ADJ. tremulous: N. the act of shaking the voice; the act of producing a shake on a musical instrument. QUA'VERED, pp. *-vĕrd:* ADJ. distributed into quavers. QUA'VERER, n. *-vĕr-ĕr*, one who quavers.

QUAY, n. *kē* [F. *quai;* Dut. *kaai;* Bret. *kaé*, a quay, an inclosure, a dike along a river or canal: Dut. *kade* or *kae*, a dike or causeway]: paved bank or wharf, usually a platform on piles, or of masonry, surmounted with cranes, tramways, and other appliances for lading and discharging cargoes from shipping. QUAY'AGE, n. *-āj*, quay dues; wharfage. QUAY-BERTH, a loading or discharging space for a ship in a dock: also erroneously written *key* and *keyage*. *Note.*—QUAY or KEY is properly a space on the margin or shore of a sea or river, built up and compacted by beams and planks, as if it were by *keys*, and fitted also for *keying* or securing vessels to its side. *Kēy* is used in building operations to indicate any bond for firmly uniting separate parts; thus *key-stone* is the stone which binds together the two sides of an arch. *Kēy*, that which binds or opens, and *key*, a ledge of rocks, an islet, are thus confusedly connected with *quay*, a bank on the side of a river (see KEYS).

QUAY, *kwā*, MATTHEW STANLEY: politician: b. Dillsburg, Penn., 1833, Sep. 30. He graduated from Jefferson College 1850, studied law, and began practice 1854. He was prothonotary of Beaver co., Penn., 1855–6 and 1859–61, resigning to become lieut. in the army. After serving as assistant commissary-gen. of Penn., and later as private sec. to the gov., he was made col. of a Penn. regt. 1862, Aug.; but was mustered out of the service the following Dec. on account of ill health. After serving as a state agent at Washington, he was milit. sec. of Penn.; member of the legislature 1865–67; founded at Beaver, Penn., a newspaper of which he was editor, 1869; and was sec. of the state 1873–78 and 1879–82, in the interval holding the position of recorder of Philadelphia. He was state treasurer of Penn. 1885–87; was elected U. S. senator 1887 and 1893; and conducted the presidential campaign 1888 as chairman of the republican national committee. In 1895 he was a member of the committees on commerce, epidemic diseases, public buildings and grounds, woman suffrage (select), and pensions.

QUEAN, n. *kwēn* [AS. *cwen*, a woman: Dut. *quene*, a vain woman: Dan. *qvinde*, a woman: the same word as QUEEN]: disrespectful or abusive term for a woman; a worthless woman.

QUEASY, a. *kwē'zĭ* [Low Ger. *quaos'n*, to pick and choose in eating: Icel. *queisa*, colic: Wal. *quase*, a belch]: sickish at stomach; squeamish; causing nausea. QUEA'SILY, ad. *-lĭ*. QUEA'SINESS, n. *-nĕs*, nausea; qualmishness.

QUEBEC: city; capital of the province of Q., Canada; at the junction of the St. Lawrence and St. Charles rivers, and on the Canadian Pac., the Gr. Trunk, the Q. & Lake St. John, and the Q. Cent. railways; 180 m. n.e. of Montreal, 503 m. e.n.e. of Toronto, 430 m. n.n.e. of New York. It is built on a steep promontory, the highest part of which, Cape Diamond, is 333 ft. above the level of the river. This position gives it exceptional importance as a military station, and renders its historic citadel the most impregnable defensive work on the American continent. The fortification covers an area of 40 acres, and commands a magnificent view of the country, including the Falls of Montmorenci, the celebrated Plains of Abraham, the Point Levis fortifications on the opposite side of the St. Lawrence river, and the grand harbor with its great docks and tidal basin. Fears have been expressed lest the rock on which the citadel is built should become disintegrated to the extent of imperilling the main works, as large quantities of rock have become dislodged in spite of a heavy retaining wall, built 1881, to prevent such an accident. The city is divided into an Upper Town, containing the grounds and buildings of the principal religious organizations, public buildings, most costly residences, churches, gardens, and retail stores; and a Lower Town, in which are the great warehouses, financial institutions, wholesale and retail stores, the ancient church of Notre Dame des Victoires, and the curious Champlain Market. The tourist usually passes from one part of the city to the other—that is, from the Lower Town to the Upper—by the passageway known as Breakneck Stairs, though there are other and more comfortable methods. While the Lower Town has much to arrest the attention, the Upper Town possesses the largest historic interests, and contains attractions of which one never tires. Much of the old wall, the gateways, and the ancient fortifications has been torn down. Several handsome modern gates have replaced the old ones. From the grand Dafferin Terrace, 1,400 ft. long and 200 ft. above the river, another stretch of scenic beauty is disclosed. Nearby are the parliamentary and department buildings, the city-hall, court-house, post-office, custom-house, the Anglican cathedral, the Rom. Cath. archiepiscopal palace, the Basilica, and Laval Univ. There also are the Ursuline Convent, Convent of the Good Shepherd, Female Orphan Asylum, St. Bridget's Asylum, the Ladies' Prot. Home, the Finlay Asylum, the Gray Nunnery, Morrin College, the Laval Normal and Model School, and the Chalmers, Methodist, Jesuit, St. Matthew's, St. Jean Baptiste, St. Andrew's, and St. Patrick's churches. The public monuments include one to the memory of Gen. Wolfe, on the battle-field of the Plains of Abraham; another to Wolfe and Montcalm jointly in the Governor's Garden; an iron pillar on the Ste. Foye road, commemorating the British and French who fought under Murray and Levis 1760; and a shaft to the memory of Jacques Cartier and Biebeuf the Jesuit. Four martello towers in elevated positions enhance the picturesque effect of the locality. Among the suburban attractions, nearly all replete with

enduring interest, are Wolfe's Cove, Près-de-Ville, Montmorenci Falls, the mouth of the Lairet where Cartier made his first winter rest, Chateau Bigot, the former Ile de Bacchus (now Orleans Island), the Loretto Falls and adjoining Indian settlement, the Louise embankment, and the Chaudière Falls. Of all the French settlements in Canada, Q. best retains its ancient form. Everywhere are monuments of strange and eventful history and much of extreme antiquity, as the Basilica, or French cathedral, which was begun 1647 and consecrated 1666. With the exception of the church in St. Augustine, Fla., it is the oldest one on the continent.

The city is lighted with gas and electricity and has a water supply from Lake St. Charles. Its govt. is vested in a mayor and a council of 10 aldermen and 20 ward councilors. Formerly Q. was noted for its ship-building interests; but this industry has decreased as manufacturing has increased. The principal industries are the shipping of lumber and the manufacture of leather, boots and shoes, and tobacco. For the accommodation of its shipping interests, the city has dock and wharfage facilities of nearly 3 m. in extent. Its imports 1893 were $3,555,607; exports, $5,193,370. There were 5 banks of circulation, with an aggregate capital of $6,600,000, 3 savings-banks, and 3 branch banks. The estimated property valuation was $17,266,782, which was taxed at one-fifth the rental value, about $1,275,000, and the public debt was $6,190,808. In 1895 there were 6 daily and 7 weekly periodicals, the majority in the French language. For history, see QUEBEC, PROVINCE OF. Pop. (1871) 59,699; (1881) 62,446; (1891) 63,090.

QUEBEC, *kwē-bĕk'*, PROVINCE OF: province belonging to the Dominion of Canada (see CANADA), formerly known as Lower Canada or Canada East; bounded e. by Labrador and the Gulf of St. Lawrence, s.e. by New Brunswick, Me., and N. H., s. by N. Y. and Vt., s.w. by the province of Ontario (q.v.), and n. by an indefinite tract toward Hudson Bay; 227,500 sq. m.; cap. Quebec. It is drained by the St. Lawrence, which flows through it, and its tributaries, the Ottawa, Richelieu, St. Francis, Chaudière, St. Maurice, and Saguenay rivers. The surface is more varied than that of Ontario, hilly in parts, with large tracts of valuable pine forest. There are four distinct mountain ranges, (1) Notre Dame, which extends from the lat. of Quebec along the course of the St. Lawrence on the s. to the Gulf of St. Lawrence near Gaspé Point; (2) the Laurentian, on the n. of the St. Lawrence; (3) Mealy, extending from lat. 75° w. to Sandwich Bay; (4) Wotchish, a crescent-shaped range between the Gulf of St. Lawrence and Hudson Bay. The Laurentian is about 1,000 ft. high, and the Mealy about 1,500. The surface generally is a series of fertile valleys, and the level country on each side of the St. Lawrence, known as the Champaign of Canada, is the richest in production. More than 30,000 sq. m. are underlaid by a limestone formation with a moderate dip;

and sandstone, bog-iron ore, shell-marl, and petroleum are abundant. The chief mineral resources are copper, iron, galena, lead, zinc, platinum, some gold and silver, granite, slate, marble, and soapstone. Furred and feathered game abound in the forests, which, beside pine, yield ash, birch, beech, elm, hickory, black-walnut, maple, cherry, butternut, spruce, and fir. The flora is large, varied, and exceedingly rich. The climate in general is colder in winter and warmer in summer than that of Ontario; in the upper Saguenay valley it is quite mild and equable. Agriculture yields wheat, oats, potatoes, barley, and buckwheat, with Indian corn in select localities; apples and plums grow in abundance; cattle, sheep, and horses are raised for home use and export; and dairy products are large.

For administrative purposes Q. is divided into 63 counties, and for judicial into 20 districts. Public affairs are administered by a lieut.gov.; an executive council of 7 members; a legislative council of 24 members appointed for life by the lieut.gov.; and a legislative assembly of 65 members elected by popular vote. The province has 24 seats in the Dominion senate and 65 in the house of commons. The judicial authority is vested in a superior court, a court of appeals, district courts, and minor tribunals, the district courts having equal jurisdiction in all matters, excepting such as involve revision and appeal. The provincial sec. is the minister of public instruction, and is assisted by a council of 21 members, of whom two-thirds belong to the Rom. Cath. Church. The prevailing religion is Rom. Cath., and the majority of the people are French or of French extraction. Public business is conducted chiefly in the French language, both French and English being permissible in the provincial assembly. In 1895 there were 5,609 public, high, and superior schools, with 9,297 teachers, 268,275 pupils, and $1,399,945 expenses. The Rom. Cath. Chh. had an abp. in Quebec, and bps. in Montreal, Ottawa, Three Rivers, St. Hyacinthe, and Rimouski; the Church of England, a bp. (metropolitan of Canada) in Montreal; the Presb. Church of Canada is a branch of the Kirk of Scotland; the Canada Presb. Church is independent; and the other Prot. denominations, Congl., Bapt., Meth., etc., are comparatively small.

The Saguenay river; the Falls of Montmorenci, the Chaudière, and the St. Anne; and the Long Sault, Cedars, and Lachine rapids are the most popular of scenic attractions. The Indian reservations are those of the Nipissings, Algonquins, Abenakis, Hurons, Micmacs, Amalicites, Montagnais, and Nasquapees. In 1894 the gross receipts of the province were $11,792,577; gross expenditures, $11,769,868; and gross debt, $28,196,754. The net revenue was $4,270,694, derived from a govt. subsidy, sale of crown lands, lease of inland fisheries, and direct taxation; and the net expenditure $4,550,540.

The province is believed to have been discovered by

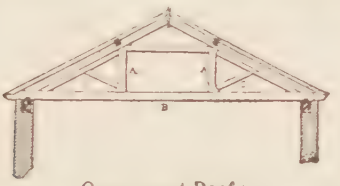
Sebastian Cabot 1497; but the first attempt at settlement was made by Jacques Cartier (q.v.), who took possession of the Gaspé country in the name of the King of France 1534, entered and named the gulf and river of St. Lawrence 1535, and built a fort and made a temporary settlement near the site of Quebec 1541. A permanent settlement was made at Quebec 1608 by the French, who occupied the country till 1759, excepting 1629–32, when the English held it by conquest. The English under Gen. Wolfe captured Quebec city 1759, and all of Canada was surrendered to the British 1760, and confirmed to them by the Treaty of Paris 1763. During the American revolutionary war, the colonial army made several unsuccessful attempts to capture Quebec.—The province was divided into Upper and Lower Canada 1791; the parts were reunited and Lower Canada took the name of Canada East 1841; and the English and French speaking parts were again divided 1867, the former taking the name of the province of Ontario and the latter the province of Quebec. Pop. (1871) 1,191,575; (1881) 1,359,027. (1891) 1,488,586.

QUEBRACHO, *kā-brâ'chō:* tree of which there are several varieties, found mostly in S. America. The wood is very hard, and that of some varieties contains large quantities of tannin. The bark of the white Q. is used for medicinal purposes, especially as a febrifuge and for lung and bronchial affections. The wood and bark of the red Q. are in demand for tanning leather.

QUEDAH, *kā'dâ*, or KEDAH, or KEDDAH, *kĕd'dâ*, or KEEDAH, or KIDAH, *kē'dâ:* half independent state, on the W. coast of the Malay Peninsula, on the Strait of Malacca; from about lat. 5° n.—7° n.; average breadth about 50 m. The British province Wellesley, between it and the sea-coast opposite Penang, was separated from it and ceded to the British 1800, by a treaty in which the British agreed to pay the rajah $10,000 a year. Q. nominally owes a kind of feudal subjection to Siam, but is in reality much more subject to Britain.—The cap., from which the state takes its name, is at the mouth of the Q. river: pop. 30,000.

QUEDLINBURG, *kwĕd'lin-bûrĝh:* town of Prussian Saxony, at the n. base of the Harz Mountains, on the river Bode, 35 m. S.W. of Magdeburg. Founded by Henry the Fowler 920, it consists of an old town, a new town, and several suburbs, and is surrounded by a wall flanked with towers. On an eminence overlooking the town stands the castle, which, prior to the Reformation, was the residence of the abbesses of Q., who were independent princesses of the empire, and had a vote in the diet, and other privileges. This town was a favorite residence of the German emperors of the Saxon line. Here Klopstock and Karl Ritter were born. It has now considerable manufactures of woolens, machinery and sugar, and an active trade in corn and cattle. Pop. (1880) 18,437; (1890) 20,765.

QUEEN, n. *kwēn* [AS. *cwen*, a woman, a wife, queen: Sw. *qvinna*, a woman: Goth. *qvens*, *qvēins*, a woman: Gr. *gunē*; Skr. *jani*, a woman]: the wife of a king; a female sovereign (see below): the highest of her kind: V. to play the queen. QUEENLY, a. *-li*, or QUEEN-LIKE, like a queen; becoming a queen: suitable to the dignity of a queen. QUEEN-BEE, the fertile female of a hive or swarm. QUEEN-CONSORT, the wife of a reigning king. QUEEN-DOWAGER, the widow of a king (see QUEEN, below). QUEEN-MOTHER, the mother of a reigning king. QUEEN-POST, one of the two posts rising at right angles from the tie-beam, which passes across the roof of a



Queen-post Roof:
A, A, Queen-posts; B, tiebeam; C, C, struts or braces.

house—they support the timber roof: when there is only one it is called a *king post* (see ROOF). QUEEN'S BENCH: see under KING. QUEEN'S COLOR, in *Brit. mil.*, one carried on the right of the two colors of a battalion of infantry: in the *line*, the union-jack with the imperial crown and the number of the regiment; in the *guards*, the color is crimson, with devices. QUEEN'S COUNSEL: see under KING. QUEEN'S EVIDENCE (see KING'S EVIDENCE). QUEEN'S METAL, alloy formed by fusing 100 parts of tin with 8 parts of antimony, 4 parts of copper, and 1 part of bismuth. It is a kind of Britannia metal, and is used for teapots and similar domestic articles. QUEEN REGENT or REGNANT, a queen reigning in her own right (see QUEEN, below). QUEEN'S YELLOW, a color formed from the subsulphate of mercury. QUEEN'S WARE, a cream-colored glazed earthenware. QUEENS, in *slating*, slates three feet long and two feet wide.

QUEEN: in its primary signification, the king's consort, who has in all countries been invested with privileges not belonging in other married women. The English Q., unlike other wives, can make a grant to her husband, and receive one from him. She can sue and be sued alone, and purchase land without the king's concurrence. The Statute of Treasons makes it treason to compass her death, or to violate her chastity, even with her consent, and the Q. consenting is herself guilty of treason. If accused of treason, the Q. is tried by the peers of the realm. The Q.-consort is exempt from paying toll, and from amercements in any court. She has a household of her own, consisting of six Ladies of the Bedchamber, a Lord Chamberlain, Vice-chamberlain, Mistress of the Robes, Master of the Horse, and three Equerries, as also

her attorney-general and solicitor-general, distinct from those of the king, who are entitled to take a place within the bar with the king's counsel, and prosecute suits in law and equity for the Q. It has been usual to crown the Q.-consort with solemnities similar to those in the coronation of the king. In the case of Queen Caroline, consort of George IV., who was living apart from her husband, this was not done, though her right to coronation was argued by Brougham before the privy council. The Q.'s personal expenses are defrayed from the king's privy purse.

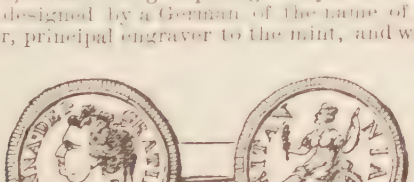
The *Queen-dowager* is the widow of the deceased king. She retains most of the privileges which she had as Q.-consort, nor does she lose her dignity by re-marriage; but it has been held that no one can marry the Q.-dowager without permission from the king, on pain of forfeiture of lands and goods. On the marriage of a king, or accession of an unmarried prince, parliament makes provision for the Q.'s maintenance, in case of her survivance. An income of £100,000 a year, with two residences, was settled on the Q. of George III.; and the same provision was made for the late Dowager Queen Adelaide, at the commencement of the reign of William IV. The Q.-dowager, when mother of the reigning sovereign, is styled the Q.-mother. Until the time of George II., queens-consort bore the arms of the king impaled with their paternal coat, with the king's dexter and their paternal sinister supporter; since that period, they have used both royal supporters. It is not usual to place the arms of the Q.-consort within the Garter.

The *Queen-regnant*, called usually the Queen, is a sovereign princess who has succeeded to the kingly power. In modern times, in those countries where the Salic law does not prevail, on failure of males, a female succeeds to the throne. By an act of Queen Mary, the first Q.-regnant in England, it was declared 'that the regall power of this realme is in the quene's majestie as fully and absolutely as ever it was in any of her most noble progenitours kinges of this realme;' and it has since been held, that the powers, prerogatives, and dignities of the Q.-regnant differ in no respect from those of the king. The husband of the Q.-regnant is her subject; but in the matter of conjugal infidelity, he is not subjected to the same penal restrictions as the Q.-consort. He is not endowed by the constitution with any political rights or privileges, and his honors and precedence must be derived from the Q. The late Prince Consort was naturalized by 3 and 4 Vict. c. 1, 2, words being used which enabled him to be a privy-councilor, and sit in parliament; and by 3 and 4 Vict. c. 3, Queen Victoria was empowered to grant him an annuity of £30,000; but it was provided that his royal highness was not, by virtue of his marriage, to acquire any interest in the property of her majesty. By a decree of the Q., Prince Albert held place, pre-eminence, and precedence next to the sovereign.

A Q.-regnant is the only woman who is in her own right entitled to bear her arms in a shield and not in a lozenge. She is entitled also to the exterior ornaments of helmet, mantling, crest, and motto, and may surround her shield with the Garter, and the collars and ribbons of all other orders of knighthood of which she is sovereign.

QUEEN ANNE'S BOUNTY: fund appropriated to increase the incomes of the poorer clergy of England, created out of the first-fruits and tenths, which before the Reformation formed part of the papal exactions from the clergy. The first fruits are the first whole year's profit of all spiritual preferments, and the tenths are one-tenth of their annual profits, both chargeable according to the ancient declared value of the benefice; but the poorer livings are now exempted from the tax. Henry VIII., on abolishing the papal authority, annexed both first-fruits and tenths to the crown; and statute 2 and 3 Anne, c. 11, first formed them into a perpetual fund for augmentation of poor livings, and advancing money to incumbents for rebuilding parsonages.

QUEEN ANNE'S FARTHINGS: famous from the large prices sometimes given for them by collectors. Their rarity, however, has been much overrated; it was, indeed, long a popular notion that only three farthings were struck in Queen Anne's reign, of which two were in public keeping—a third was still in circulation, and, if recovered, would bring a prodigious price. The Q. A. F. were designed by a German of the name of Crocker or Croker, principal engraver to the mint, and were only



Queen Anne's Farthing.

patterns of an intended coin, having never been put into circulation; but they are not exceedingly scarce. A few were struck in gold.

QUEENBOROUGH, *kwēn'bŭr-ŭh*: village in the Sheppey dist. of Kent, about 2 m. s. of Sheerness; founded by Edward III., and named after his queen, Philippa. A line of steamers between Q. and Flushing affords direct and rapid passage from England to the continent.

QUEEN CHARLOTTE ISLANDS: group of islands in the n. Pacific between lat. 51°—54° n., long. 130°—133° n., about 80 m. n. of Brit. Columbia, to which it belongs; 110 n.w. of Vancouver Island. It was named by Capt. Dixon of the *Queen Charlotte*, who visited the islands

1787, and for whom the channel north of them is called. It consists of four principal islands, Graham, Moresby, Prevost, and North, in an archipelago of smaller islands. The whole group is about 180 m. long and 60 m. wide. Graham at the north, and much the largest, has about 3,000 sq. m.; and Moresby, second in size, 1,500. The group is mountainous, some of the elevations rising over 5,000 ft. There are forests of pine, cedar, and other trees on the mountains and in the valleys, but the timber has not yet a commercial value. Fishing is the principal occupation of the inhabitants, who are Indians called Haidas. Halibut, herring, cod, salmon, and dogfish, the latter valuable for oil, abound, and are the only exports. Copper and iron ores and a bed of anthracite coal have been discovered.

QUEEN CHARLOTTE SOUND; see VANCOUVER ISLAND.

QUEEN OF THE MEADOW: see SPIRÆA.

QUEEN'S BENCH, or KING'S BENCH, in England: one division of the High Court of Justice. The King's Bench, in which the king was wont to sit in person, is presided over by the chief-justice of England, highest of all the judges next to the lord chancellor. See KING'S BENCH. The consolidation of the Common Law Courts, 1881, abolished the Common Pleas and Exchequer Divisions, leaving the Q. B. Division as the Court or Division of Common Law. The lord chief-justice has now 14 Common Law judges in his division (the other three divisions of the High Court of Justice being Chancery; Bankruptcy; and Probate, Divorce, and Admiralty). The Q. B. is the highest court which has criminal jurisdiction, and such jurisdiction is unlimited; but this jurisdiction is seldom exercised originally. For it is only when an indictment is removed from an inferior court into the Q. B. that a criminal trial takes place there; and this occurs only when some peculiar difficulty or importance renders it expedient to remove the case from the sessions or assizes. Yet there are certain criminal matters which are part of its ordinary administration; e.g., a criminal information, when filed by the attorney-general, or the master of the crown-office, charging a person with a criminal offense, is tried in the Q. B., and can be tried in no other court. The Q. B. exercises superintending control over all inferior tribunals, also over public bodies, by commanding them to do a specific duty, by writ of Mandamus; or by prohibiting them from going on with some matter over which they have no jurisdiction. The Q. B. also entertains appeals from justices of the peace on a vast variety of matters. The chief-justice has latterly been usually made a peer, or has the option of becoming one if he pleases. For the Court of Appeal, which, with the High Court of Justice, constitutes the Supreme Court of Judicature for England, see APPEAL. There is a Q. B. division in the Irish High Court of Justice.

QUEEN'S COLLEGE: one of the earliest institutions in England for higher education of women, established in London 1848, incorporated by royal charter 1853. Its foundation was due largely to the exertions of Prof. Maurice. The college curriculum provides a higher course for students over 18 years of age, a 4 years' course for girls at least 14 years old, a preparatory class, and a school for girls under 14. The lectures in the higher course embrace all the departments of the higher education at the universities. Several scholarships have been founded; one by Queen Victoria, known as the 'Queen's Scholarship.' The college, under its charter, grants certificates of associateship, also of proficiency in any single subject.

QUEEN'S COLLEGE, CAMBRIDGE: one of the colleges of Cambridge Univ., England; founded 1446 by Margaret of Anjou, consort of Henry VI., refounded 1465 by Elizabeth Woodville, consort of Edward IV. The college consists of a president and 14 foundation fellows; the fellowships being tenable for ten years from M.A. without being subject to any restriction whatsoever; while any fellow who takes holy orders, and has not a benefice of the net annual value of £300, may hold his fellowship for life. The new statutes provide that there shall be at least 14 scholarships, tenable till B.A., ranging between £30 and £50; the number and value of the scholarships to be augmented at discretion of the president and fellows. Besides these, there are 5 exhibitions, ranging from £12 to £20; and there are funds to the amount of £130 per annum at the disposal of the president, for aid of deserving students of limited means. There are likewise a number of prizes, ranging from £5 to £30. The college holds the patronage of ten benefices in the counties of Bucks, Cambridge, Essex, Leicester, Norfolk, Notts, and Wilts.

QUEEN'S COLLEGE, OXFORD: one of the colleges of Oxford Univ., England. In 1340, Robert de Eglesfield, confessor to Queen Philippa, founded a collegiate hall in Oxford, under the name Hall of the Queen's Scholars. Theological study was its main object, and residence and poverty were rigidly enforced. There was to be a provost, 12 fellows, and 72 poor boys on the foundation. The commissioners of 1855 introduced great changes. Now the college consists of a provost, 19 fellows, 15 scholars or taberdars, 2 Bible-clerks, and 4 Eglesfield exhibitioners. The college has more than 20 exhibitions and 30 benefices in its gift, as also the principalship of St. Edmund Hall.

QUEEN'S COLLEGES in Ireland: founded 1845, opened 1849 at Belfast, Cork, and Galway respectively, for giving to the youth of Ireland higher education in classics, science, law, medicine, and engineering. Each college has a pres. and 16 to 18 professors, and has a number of scholarships in its command. The course of study in the arts faculty is usually three sessions. Formerly, these colleges were feeders to the Queen's University (founded 1850), an examining and degree-granting body in Dublin, which gave diplomas only to those who had attended the Queen's Colleges for three sessions. In 1879, the Queen's Univ. was superseded by the Royal Univ. of Ireland, and compulsory connection between the colleges and the univ. was dissolved. But the Royal Univ., which grants its degrees to all comers duly qualified, holds open to the Queen's College students (as well as those of Rom. Cath. colleges or institutions) the distinction of its diplomas. The Q. C. are co-educational.

QUEEN'S COUNSEL, in the British Legal System: certain barristers who receive from the queen a patent giving them preaudience over their brethren, except for which they would rank only according to seniority of their standing as barristers. See KING'S COUNSEL. The advantage of appointing Q. C. is that it enables the most able or successful counsel to take precedence of those of the same or longer standing, and to take chief conduct of causes. In practice, there are almost invariably two counsel engaged on each side, called a leader and a junior, the leader usually a Q. C. The appointment is made by the crown, on nomination by the lord chancellor. The practice of appointing crown counsel is adopted in Ireland and in Scotland. The notion that the appointment of Q. C. entitles the counsel to a salary from the crown is a mistake, except as to the attorney and solicitor general. When a Q. C. is engaged in a criminal case against the crown—e.g., to defend a prisoner—he must get special license from the crown, which is always given on payment of a small fee. In courts of law and equity, a Q. C. is entitled to preaudience over all other counsel, except those who were appointed Q. C. before him. The order of sergeants-at-law, more ancient than that of Q. C., came to be inferior in rank; and since 1880 is practically extinct. Sir Francis Bacon was the first Q. C. appointed.

QUEEN'S COUNTY: inland county of the province of Leinster, Ireland; bounded n. by King's county, e. by Kildare and Carlow, s. by Kilkenny, w. by Tipperary and King's county; 424,854 acres, of which 363,153 are arable. Acres under crop (1891) 131,548; cattle, 86,184; sheep, 98,095; pigs, 34,350. Q. C., for the most part, is within the basin of the Barrow, which is the chief river, and is partly navigable for barges. On the n.w. border are the Slieve Bloom Mountains, and the Dysart Hills occupy the s.e.; the rest of the surface being flat or gently undulating. In its geological structure, it belongs to

the great limestone district; but the Slieve Bloom Mountains are sandstone, and the Dysart Hills include coal, but not in deep nor profitably worked beds. Coarse linen and cotton cloths are manufactured in small quantities. The chief town is Maryborough; pop. (1881) 2,872. The national schools 1880 were 107; pupils, 13,274. Q. C. anciently formed part of the districts of Leix and Ossory; and on the submission of O'More to the English, the territory retained a qualified independence. Under Edward II., the O'Mores became so powerful, that a protracted contest was maintained by them with the English. In the reign of Edward VI., Bellingham, the lord-deputy, succeeded in reannexing the territory of the O'Mores to the Pale (q.v.); and a new revolt in Mary's reign led to measures by which it was finally reduced to a shire, under the name Q. C., in honor of Mary, from whom also the chief town, Maryborough, was called. There are a few antiquities of interest—a perfect round tower, and two in less perfect condition, and some ecclesiastical and feudal remains, the most important of the latter being a castle of Strongbow on the picturesque Rock of Dunamase. Q. C. is traversed by the Great Southern and Western, and by the Midland Great Western railways, also by a branch of the Grand canal. Pop. (1861) 90,750; (1871) 79,771; (1881) 72,598, of whom 63,963 were Rom. Catholics, 7,743 Prot. Episcopalians, and the rest Protestants of other denominations. (1891) 64,639.

QUEENSFERRY, *kwēnz'fēr-ri*, SOUTH AND NORTH: a burgh, and a village, in Scotland.—South Q. is a royal and parliamentary burgh in Linlithgow-shire, on the s. shore of the Firth of Forth, about 9 m. w.n.w. of Edinburgh. It was erected into a royal burgh 1636, but had been for centuries a burgh of regality. The walks and scenery about South Q., with Hopetoun House and grounds on the w. and Dalmeny Park on the e., are very beautiful, and the town itself is a resort for sea-bathing. The Forth—much wider both above and below the ferry—here narrows to about two m. Pop. (1891) 1,529.—*North Queensferry* is a small village in Fifeshire, on the n. shore of the Firth of Forth, opposite South Q.; pop. (1881) 360.

QUEENSLAND, *kwēnz'land:* prosperous British colony occupying the whole n.e. portion of Australia, commencing at a point of the e. coast about 400 m. n. of Sydney, called Point Danger, lat. 28° 8′ s. The greater portion of the s. boundary is formed by the 29th parallel of s. lat. The e. seaboard extends about 1,300 m. to Cape York, the extreme n. point of the continent, lat. 10° 40′. The mean breadth of the territory is 900 m. from the e. coast-line to the meridian of 138° e. long., which forms the w. boundary. This includes the greater portion of the Gulf of Carpentaria, which has a seaboard of about 900 m. The whole of Q. comprises 668,497 sq. m.—about 12 times the area of England and Wales.

The portion of the colony along the e. coast is indented with numerous bays, outlets of many navigable rivers, having their sources in the cool gorges and deep recesses of a great n. and s. mountain-range, parallel with the sea-coast, at a distance of 50 to 100 m. The summits of this great 'dividing range' rise 2,000 to 6,000 ft. above sea-level. Numerous spurs are given off from the range in ridges sloping gradually toward the coast. These ridges are principally of quartz, and in many places form good natural roads. The ridges are usually covered with a variety of fine and valuable timber. The iron-bark, bloodwood, box, and other wood, very valuable to the farmer for fencing and building, abound here.

Unlike almost every other portion of Australia, Q. is correctly described as 'a land of rivers and streams.' These rivers find an outlet in the many large and beautiful bays and estuaries on the e. seaboard. One of these, Moreton Bay (q.v.), receives the waters of five navigable rivers. The largest of these, the Brisbane, is navigated by good-sized steamers for 75 m., and is nearly a quarter of a mile wide 15 m. from its mouth. The principal rivers on the e. seaboard are the Brisbane, the Burnett, the Mary, the Calliope, the Boyne, the Fitzroy, the Pioneer, and the Burdekin. The longest tidal river in Q. is the Fitzroy, which drains an area of not less than 50 millions of acres, and is navigable as far as Yaruba, 60 m. from its estuary in Keppel Bay. It receives, as its principal tributaries, the Dawson, Mackenzie, and Isaacs, large streams flowing several hundred m. from the n.w., w., and s.w. parts of the interior. The tide at Rockhampton (40 m. from the embouchure of the river) rises 14 ft., and the stream is thus rendered navigable for vessels of considerable burden.

The banks of the rivers are usually elevated, and in many places consist of very rich alluvium, brought down from the great mountain-ranges. This alluvial soil is frequently of very great depth, and is marked everywhere by magnificent growth of timber, very unlike the ordinary Australian wood. The enormous fig-trees and gigantic eucalypti tower aloft, and spread out their great arms, festooned with vines and flowering parasites, which throw themselves over every spreading branch, and deck it with their varied and brilliant colors; the

tall pine-trees shoot up their straight stems to great height; while the cedar, the myrtle, the rosewood, and tamarind trees display their rich green foliage in every variety of shade. A thick evergreen hedge of mangroves covers the banks, preserving them from the wash of the stream; and at certain seasons of the year, this is fringed with thousands of flowering lilies.

Ordinarily, the e. seaboard part of the country assumes the appearance of park-scenery in Great Britain, the trees standing at some distance apart, and the ground between them covered with grass, generally green and luxuriant throughout the year. The regular showers in the summer season keep the grass luxuriant generally during the hot months; though a dry summer appears to have been experienced in this part of Australia about once in every six or seven years. The frosts of winter being generally so slight as not to injure vegetation, the country is almost always green from Jan. to December.

Beyond the 'Andes,' or great dividing-range, the country presents features of still greater beauty and fertility. Great plains—10, 15, or 20 m. across—stretch out their level surface unbroken by a single tree, but covered with luxuriant grass, and often purpled over with fragrant herbage. These great plains are of rich black soil, and well watered with a network of streams from the gradual slopes of the mountain-range. The soil in this locality is admirably adapted for tillage; and within a certain distance of the mountain-range, the rains fall with great regularity. The land here is lightly timbered, and is cleared with less labor than on the lower lands, and the soil is peculiarly adapted for growth of wheat of the finest quality. The yield per acre has sometimes been as much as 50, and even 60 bushels to the acre, of 63 lbs. to the bushel: the average yield may be estimated at 30 bushels per acre. Indian corn and other cereals, as well as all the European fruits, grow luxuriantly, and come to the greatest perfection in this favored locality, which has been called the 'Garden of Queensland.'

This country, w. of the great dividing-range, stretches w. in a series of fine plateaux 400 or 500 m. and, with interruptions by other mountain-ranges crossing the main range at right angles, it extends more than 1,000 m. toward the fertile plains bordering the shores of the Gulf of Carpentaria.

A third distinct portion of Q. is formed by the country which falls off in a succession of steep declivities, or gradually descending terraces, from the table-land toward the lower land, which then intervenes between these terraces and the w. boundary-line of the colony and of S. Australia.

The 'settled districts,' much the most important part of the colony, occupy the s. part of the strip watered by rivers discharging eastward at the Pacific. This region, a comparatively small area in s.e. Q., is not merely the most populous and rich, but is most suitable for agricult-

ure, and contains the chief deposits of coal and gold. Sheep do not thrive here so well as further west. A second district is watered by rivers flowing n.w. to the Gulf of Carpentaria; it is a partially settled pastoral country, with some mines. The great pastoral plains, above mentioned, form the third drainage area, the streams in it running partly into the marshes of S. Australia, or into the Darling and Murray rivers.

Two-thirds of Q. lie within the tropics. The climate on the whole is hot, but varies much according to situation. At Brisbane, in the temperate part of the country, the average temperature in recent years was 78°; absolute maximum, 108°; absolute minimum, 34°. The climate may fairly be compared with that of Madeira, which it is said to resemble. On the n. coast the monsoons blow regularly, and the year is divided into seven dry and five wet months. Nov. to Apr. is the rainy season. On the downs and high lands the air is cool, and on the e. coast the sea-breeze tempers the heat. The rainfall varies prodigiously both according to locality and from year to year. In the same year (1878) 56 inches fell at Brisbane in 124 days; at Mackay, the rainfall was 86 inches; at Toowoomba, on the Darling Downs, 100 m from Brisbane, only 29 inches; and at other places, only 19, 17, and even 10. In 1865, at Brisbane, 24 inches fell; 1870, 79 inches. Long droughts and destructive floods sometimes occur. In the n., especially in the low lands, the heat of the tropical sun is too great for Europeans, though gold-mining is pursued by Europeans within the tropical limits. Nevertheless, the climate of Q. is on the whole very healthful, the death-rate never having exceeded 24 per 1,000, while in some places it is only 14. The birth-rate is very high.

Land is leased for pastoral purposes, or purchased in fee simple. Leases of land in the not as yet settled districts may be had for 21 years, at a rent of 5*s*. a sq. m. for the first seven years, 10*s*. for the second, and 15*s*. for the third seven years. A condition of the lease is that the land must be stocked to the extent of one-fourth of its capacity—namely, 100 sheep or 10 cattle per sq. m. The amount so leased must be not less than 28 sq. m., nor more than 100 sq. m. The quantity of land that may be purchased by one person, and the price, vary according to the position of the land. The largest quantity anywhere sold by the system of 'conditional selection,' is 5,120 acres; the lowest, 40 acres. The lowest price is 5*s*. an acre; the highest, about 15*s*. Payment may be made in ten annual instalments. It is required that the purchaser or his bailiff reside on the land, that certain improvements be made, and part of the land be tilled. If at the end of three years all the conditions have been so far fulfilled, the purchaser may pay the money and get a deed of the land. The Homestead Law encourages the settlement of industrious farmers. On condition of continuous residence for five

years, and cultivation or improvement to the value of 10s. per acre, the homestead selector gets 160 acres or less at a nominal price. In 1884 a land act was passed under which a maximum of 1,280 acres of agricultural land can be selected on a lease for 50 years, and a maximum of 20,000 acres of pastoral land for 30 years. The agricultural land can be secured afterward in fee simple under certain conditions and in return for certain payments. About one-half the area of the colony is natural forest, and a large part of the remainder is leased for pastoral purposes, this acreage(1893) aggregating 281,316,885. The live-stock on the runs comprised 429,734 horses, 6,693,200 cattle, 18,697,015 sheep, and 68,086 hogs. The wool is remarkable for fineness. The total area under cultivation was 252,075 acres, of which 243,249 acres were under crop. Much of the soil is very fertile, and soil and climate are suited to a great variety of crops. The leading grain crop is maize, of which 93,556 acres yielded 1,824,108 bushels. Wheat, barley, oats, tobacco, coffee, rice, potatoes, arrowroot, sugar, cotton, and semi-tropical fruits and flowers, as well as those common to n. Europe, are readily grown. Sugar-cane is becoming an important crop, though its development is retarded by a lack of suitable labor. In 1893 there were 59,251 acres under this crop, of which 43,670 acres yielded 76,146 tons of sugar. A Sugar Works Guarantee Act of that year guaranteed both principal and interest on debentures issued by sugar companies on condition that the companies mortgage to the govt. land of a value equal to the amount of the debentures guaranteed.

The mineral resources of Q. are very great. The first gold fields were discovered 1858, and mines have been worked constantly since. In 1893 the output was 616,940 oz., making a total since 1858 of 9,247,413 oz., valued at $156,298,482. Mt. Morgan, in the central part of the colony, a unique formation 1,225 ft. above sea level, is the greatest gold mine in the world, its annual output having an average value of $7,290,000. The most recent discovery of gold in paying quantity is on the edge of the alluvial flat extending to the Gulf of Carpentaria. Other minerals and products valued as follows: Coal, 264,403 tons, $609,152.40; tin, 2,434 tons, $519,791.58; silver and lead, 235,267 oz., $206,102.88; bismuth, 74 tons, $51,885.36; and antimony, 30 tons, $1,399.68—total value, $1,388,331. The output of gems, comprising opals, rubies, agates, topaz, and sapphires, was valued at $21,870.00.

The internal communications 1893 comprised 2,379 m. of railway in operation, all in the hands of the govt., which had cost $79,455,872; 963 post and receiving offices, which had a revenue of $648,617; and 10,004 m. of telegraph lines, with 17,810 m. of wire and 363 stations. The receipts of the joint dept. of post and telegraph were $402,496, and the operating expenses, $1,471,486. There were 11 banks of circulation, with liabilities of $53,847,001 and assets of $95,936,200, and a govt. savings-bank,

with 123 branches, 47,885 depositors, and deposits $9,115,488. The registered shipping comprised 120 sailing vessels of 10,231 tons, and 93 steamers of all kinds of 12,469 tons—total 213 vessels of 22,700 tons.

The revenue in the year ending 1894, June 30, was $16,147,315, and the expenditure, $16,288,464; estimated value of landed property, $215,386,189; and public debt 1893, Dec. 31, $148,908,135. The imports had a total value 1893 of $21,154,525.38, and the exports, $46,814,737.32—total trade, $67,965,262. During the year, 599 vessels of 464,581 tons entered the ports of the colony, and 615 vessels of 481,047 tons cleared. The govt. maintains 20 light-houses off the coast, besides 70 minor lights and several lightships.

Education is free, unsectarian, and, by statute, compulsory. The census of 1891 showed 102,127 persons who could neither read nor write, and 14,529 who could read only. In 1893 the dept. of public instruction expended $1,114,735. There were 691 elementary schools, with 1,484 teachers and over 44,000 pupils; 10 grammar schools, with 53 teachers and 700 pupils; and 148 private schools, with 449 teachers and over 8,000 pupils. The state gives no aid to any sectarian body. The religious statistics in the census returns of 1891 showed: Church of England, 142,555 adherents; Rom. Cath., 92,765; Presb., 45,639; Lutheran, 23,383; Wesleyan, 20,917; Bapt., 10,256; other Christian sects, 28,841; Mohammedans and pagans, 17,434; Jews, 809; no religion, 5,329; beliefs not specified, 5,890.

The govt. is vested in a gov. appointed by the crown, an executive council of 8 ministers, and a parliament, consisting of a legislative council of 37 members, nominated by the crown for life, and a legislative assembly of 72 members, returned from 61 electoral dists. for 3 years. The colony is divided into 36 municipalities and 117 administrative divisions. Judicial authority is vested in a supreme court, district courts, police magistrates, and justices of the peace. For defense, the govt. maintains a militia force and assists a volunteer corps, and has a navy of 2 gun-boats, a torpedo boat, a picket boat, and 6 corps of naval artillery and naval reserve. Q. was separated from New South Wales and made an independent colony 1859, Dec. 10.

Pop. (1871) 120,306; (1881) 213,525; (1891) 393,718, of whom 8,574 were Chinese, 9,428 Polynesian, 12,000 aborigines, and 1,844 persons of other alien races; (1894, Jan. 1) est. 432,299.

QUEEN'S REGULATIONS, or KING'S REGULATIONS, in the Brit. Army and Navy: those collections of orders and regulations in force in the army and navy respectively, which guide commanding and other officers in all matters of discipline and personal conduct. The Q. R. for the navy also in great degree regulate matters of finance; whereas, in the army, financial matters are left to the War-office Regulations (q.v.).

QUEEN'S TOBACCO-PIPE: facetious designation of a peculiarly shaped kiln, which stood at the corner of the Tobacco Warehouses belonging to the London Docks. The kiln consisted of a circular brick stalk, bulging out at the bottom to a width of five ft. inside. In the interior were piled up damaged tobacco and cigars, and contraband goods, such as tobacco, cigars, tea, silk, etc., which had been smuggled, books which are attempted evasions of the Copyright Act, etc., till a sufficient quantity had accumulated, when the whole was set fire to and consumed. The total value of the goods thus destroyed was enormous, and though this wanton destruction was often censured, govt. continued till recent years periodically to fill and light the 'Queen's Pipe.' Seized goods are now sold at the periodical 'customs sales,' where unclaimed goods, samples etc., also are disposed of.

QUEENSTOWN, *quēnz'town*; called formerly COVE OF CORK: market town and seaport in Ireland, on the s. side of Great Island, in the harbor of Cork; 13 m. e.s.e. of Cork, 157 m. s.w. by w. of Dublin. It is picturesquely built on the sides of an amphitheatre, the streets, which are parallel to the beach, rising one above another in terraces. The harbor is 4 m. long by 2 m. broad, with entrance 2 m. long and 1 m. broad; is defended by Forts Carlisle and Camden at the entrance, and Fort Westmoreland on Spike Island; and can shelter a very large fleet of vessels. The principal buildings are the Rom. Cath. cathedral for the diocese of Cloyne; the Prot. Episc. church for the united parishes of Clonmel and Temple Robin; fortifications; artillery barracks; prison; and depots for ordnance, victualling, and powder stores. The port has high reputation for mild and salubrious climate, is frequented in winter by invalids, and is connected with Rushbrook—a favorite watering-place—by a handsome promenade more than a m. long. Q. was formerly a fishing village. During the wars with Napoleon I. it became important as a naval station. In 1849, on the occasion of a visit by Queen Victoria, its name was changed from the Cove of Cork to Queenstown in her honor. It has since become the station of a British admiral, of the royal yacht club, and of the American mail steamships. The majority of Irish emigrants embark here for the United States, and in recent years American tourists have given it a preference over Liverpool as place of debarkation. Pop. (1871) 10,334; (1881) 9,755; (1891) 9,123.

QUEER, a. *kwēr* [an old cant term, *quier*, bad; *quyerkyn*, a prison-house: comp. Gael. *cearr*, wrong, awkward: Ger. *quer*, across, athwart]: curious; out of the common way; odd; singular. QUEER'LY, ad. *-li*. QUEER'ISH, a. *-ish*, rather queer. QUEER'NESS, n. *-nēs*, oddity; singularity.

QUEEST, n. *kwēst* [Icel. *qrisa*, a bird: Eng. *cushat*] the European wood-pigeon; the cushat or ring-dove.

QUEINT, a. *kwĕnt:* OE. for QUENCHED.

QUELL, v. *kwĕl* [Dan. *quæle*, to choke: AS. *cwellan*, to kill; *cwellere*, a man-slayer: Dut. *kwellen*, to plague or vex: Norw. *querka*, to strangle]: to cause to cease; to crush; to put an end to; to quiet; to calm; to reduce or bring down: N. in *OE.*, murder. QUELL'ING, imp. QUELLED, pp. *kwĕld.* QUELL'ER, n. *-ėr*, one who crushes or puts down.—SYN. of 'quell, v.': to crush; overpower; subdue; put down; quiet; calm; allay.

QUELPART, or QUELPAERT, *kwĕl'pârt:* island 60 m. off the s. coast of Corea; about 60 m. long by 17 broad. It is rock-bound and mountainous, the volcanic Mt. Auckland (native name Hella-san) being 6,500 ft. high. It has fertile soil and good timber, and is populous. The people differ much from Coreans, appearing to be pure Mongols, and will not permit a foreigner to land. The port is Cha'jin, and contains decayed Buddhist temples and numerous time-worn sculptured statues in the streets. The streets are narrow, and the dwellings and fortifications are built of volcanic rock.

QUEME, v. *kwēm* [AS. *cweman*, to please, to profit]: in *OE.*, to please; to fit; to suit. QUEM'ING, imp. QUEMED, pp. *kwēmd.*

QUENCH, v. *kwĕnsh* [AS. *cwencan*, to quench; *cwincan*, to decrease: O.Fris. *kwinka*, to waste away: Dut. *quijnen*, to languish]: to extinguish; to put out; to still; to repress; to allay; to stifle. QUENCH'ING, imp.: N. act of one who quenches; that which quenches. QUENCHED, pp. *kwĕnsht.* QUENCH'ABLE, a. *-ă-bl*, that may be extinguished. QUENCH'ER, n. *-ėr*, one who or that which quenches. QUENCH'LESS, a. *-lĕs*, that cannot be quenched; irrepressible. QUENCH'LESSLY, ad. *-lĭ.* QUENCH'LESSNESS, n. *-nĕs*, the state of being quenchless. —SYN. of 'quench': to stifle; extinguish; check; destroy; still; allay; cool.

QUENOUILLE TRAINING, n. *kė-nō'y'* [F. a distaff]: a mode of training trees or shrubs in a conical form, with their branches bent downward, so that they resemble a distaff.

QUENTIN, ST., *săng kŏng-tăng':* thriving town in the French dept. of Aisne; on the Somme, about 80 m. n.e. of Paris. Pop. (1890) 47,551. Q., which has a celebrated Gothic church, is the centre of the French manufacture of linen, muslin, lace, and gauze. The canal connecting the river Somme with the Scheldt was finished by Napoleon 1810. It is carried through the intervening hills by tunnels. At St. Q., a battle was fought, 1557, July 29 (Aug. 10), between the Spaniards, assisted by a body of English troops, and the French, in which the French were defeated.

QUERCITE, n. *kwėr'sīt* [L. *quercus*, an oak-tree]: a saccharine substance obtained from acorns.

QUERCITRON, n. *kwĕr'si-trŏn* [L. *quercus*, an oak-tree; *citrus*, the citron-tree, hence, yellow or lemon-color]: name both of a valuable yellow dyestuff, and of the species of oak of which it is the bark. This oak (*Quercus tinctoria*, ord. *Cūpŭlifĕræ*), called also *Dyer's Oak* and *Black Oak*, is a native of N. America—one of the noblest forest trees of the United States, found in New England, and as far s. as Georgia, though there only at a considerable elevation. The tree is now cultivated in France and Germany. The name Black Oak is given to it from the dark color of its outer bark. The leaves are obovate-oblong, dilated outward, and widely sinuated; with short, obtuse, and bristle-pointed lobes. The wood is reddish, coarse-grained, and porous, but much esteemed for strength and durability, and is used for shipbuilding. The bark is used for tanning as well as for dyeing. It is the inner bark which is the Q. of dyers. It yields a yellow crystallizable substance, *Quercitrin* ($C_{22}H_{22}O_{17}$), the yellow coloring principle, which may be extracted by means of alcohol; the tannic acid, which is simultaneously taken up, must be precipitated by addition of gelatine, after which the liquid will, on evaporation, yield crystals of quercitrin. On the addition of alum, its solution assumes a beautiful yellow color; and solutions of acetate of lead, acetate of copper, and chloride of tin precipitate it in yellow flakes. When boiled with dilute acids, it breaks up into glycose and *quercetin* ($C_{21}H_{12}O_{12}$)—a yellow crystalline substance, which is soluble in alkaline solutions, to which it communicates a

Branchlet and Acorn of the Quercitron (*Quercus tinctoria*).

golden-yellow color. The decomposition shows that quercitrin belongs to the glycosides, or compounds which, when broken up, yield sugar.

QUERCUS, n. *kwĕr'kŭs* [L.]: scientific name of the oak-tree, of many species: the *Quercus pedun culātă* is the common oak, containing much tannin.

QUERETARO, *kā-rā-tä'rō:* city; cap. of the state of Q., Mexico; in a fertile valley 6,365 ft. above sea level, 110 m. n.w. of Mexico City. It was founded by the Aztecs about 1445; was conquered by the Spaniards 1531, July; was the seat of the Mexican congress when the treaty of peace with the United States was ratified 1848; and was the scene of the last stand and of the execution of Maximilian 1867, June 19. It contains many churches, of which the Cathedrals of San Francisco and Santa Clara are the finest. Water is supplied by an aqueduct 10 m. long. The principal industry is the manufacture of cotton goods. The Hercules mill, a fortified plant, begun 1840, grounds, buildings, and machinery costing $4,000,000, is the largest in the country. Pop. (1892) 36,000.

QUERIMONIOUS, a. *kwĕr'i-mō'nī-ŭs* [L. *querīmōnĭă*, a complaint—from *quĕror*, I complain]: fretful; complaining; querulous; discontented. QUER'IMO'NIOUSLY, ad. *-lī.* QUER'IMO'NIOUSNESS, n. *-nĕs*, a complaining temper; disposition to complain.

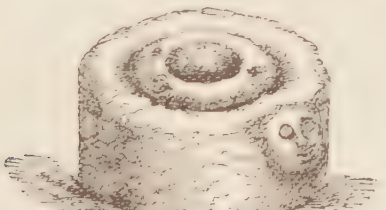
QUERIST: see under QUERY.

QUERL, v. *kwĕrl* [Ger. *querlen, quirlen*, to twirl—from *querl, quirl*, a twirling stick]: to twirl; to turn or wind round; to coil.

QUERN, n. *kwĕrn* [Goth. *qwaírnus;* AS. *cwcorn;* Icel. *quörn*, a mill]: primitive mill for grinding corn, the stone of which was turned by the hand before the invention of windmills or water-mills. It is a contrivance of great antiquity, and so well adapted for the wants of a primitive people, that it is perpetuated to the present day in remote districts of Ireland, and parts of the Western Islands of Scotland. The remains of querns have been dug up in Britain, Ireland, and continental Europe, wherever the traces of ancient population are found. They occur in the Scottish Earth-houses (q.v.), or cyclopean underground dwellings; in the Crannogs (q.v.), or lake-dwellings of Ireland and Scotland; and the very similar *Pfahlbauten* of Switzerland; and abundantly among remains of the Roman period in Britain and n. Europe. The most usual form of Q. consists of two circular flat stones, the upper one pierced in the centre with a narrow funnel, and revolving on a wooden or metal pin inserted in the lower. The upper stone is occasionally ornamented with various devices; in the Roman period, it is sometimes funnel-shaped, with grooves radiating from the centre. In using the Q., the grain was dropped with one hand into the central opening, while, with the other, the upper stone was revolved by means of a stick, inserted in a small opening near the edge. As early as 1284, an effort was made by the Scottish legislature to supersede the Q. by the water-mill, the use of the former being prohibited except in case of storm, or where there was a lack of mills of the

new species. This enactment did not prevent hand-mills from being largely used in Scotland till the beginning of the 19th c. Probably the oldest type of Q. is that which was fashioned from a section of oak; one of this kind was found in Scotland 1831, in the course of removing Blair Drummond Moss. It is 19 inches in height by 14 in diameter, and the centre is hollowed to a depth of about 12 inches, so as to form a mortar, in which the grain seems to have been pounded by a wooden or stone pestle.

A less simple variety of the hand Q., known as the Pot Q., also of great antiquity, consists of a circular stone basin, with a hole through which the meal or flour escapes, and a smaller circular stone fitting into it, perforated with an opening through which the grain was thrown into the mill. A number of these have been exhumed in Scotland, and still more in the bogs of Ireland, in which country the pot Q. is believed to be not yet altogether disused. The subjoined wood-cut represents one in the Museum of the Scottish Antiquaries; it is of



Quern.

unusually large size, 17 inches in diameter, and 8½ high, and was discovered in the parish of Gladsmuir, in E. Lothian. It is of coarse pudding-stone, and is furnished with holes in the sides, to which handles were probably attached. The iron ring is a modern addition.—See Dr. Wilson's *Archæology* and *Prehistoric Annals of Scotland*, 1. 211, *et seq.*, 2d ed. (London and Cambridge 1863).

QUERULOUS, a. *kwĕr'ū-lŭs* [L. *querulus*, complaining —from *quĕror*, I complain: It. *querulo*]: habitually complaining: discontented. QUER'ULOUSLY, ad. *-lĭ*. QUER'ULOUSNESS, n. *-nĕs*, the state of being querulous; disposition to complain; the habit of murmuring or complaining.—SYN. of 'querulous': discontented; dissatisfied; complaining; bewailing; lamenting; whining; mourning; murmuring; fretful.

QUERY, n. *kwē'ri* [L. *quærĕ*, seek, ask; *quæro*, I seek: F. *querir*, to seek, to go and fetch]: an inquiry or question to be answered or resolved; an interrogatory: V. to ask a question or questions; to mark with a query; to doubt of. QUE'RYING, imp. QUE'RIED, pp. *-rĭd*. QUE'RIST, n. *-rĭst*, one who asks questions.

QUESNAY, *kā-nā′*, FRANÇOIS: French economist and physician: 1694, June 4—1774; b. Mérey, near Montfort-l'Amaury. He studied at Paris, where, 1718, he passed surgeon. He acquired high reputation in his profession, and at his death was first physician to the king. But Q.'s fame depends almost wholly on his economistic speculations, scattered through the pages of the famous *Encyclopédie* (e.g., the articles 'Fermiers' and 'Grain'), *Journal d'Agriculture*, and *Ephémérides du Citoyen*. He invented the term 'Political Economy,' and was one of the earliest and most distinguished writers on the subject. His views were systematically set forth in a little treatise, *Tableau Economique*, nicknamed by La Harpe, *Alcoran des Economistes*. Only a few copies of this work were printed (1758), and these have now all disappeared. Nevertheless, the principles maintained by Q. are well known, partly from the sources above mentioned, but chiefly from other treatises that have met better fate than the *Tableau*, viz., *Maximes Générales du Gouvernement Economique d'un Royaume Agricole*, the *notes* to which occupy more space than the text; *Le Droit Naturel; Analyse du Tableau Economique; Problèmes Economiques;* and *Dialogues sur le Commerce et sur les Travaux des Artisans;* all to be found in Dupont's *Recueil* of Q.'s writings (Leyden and Paris 1768).

QUESNEL, *kā-nĕl′*, PASQUIER; French theologian: 1634, July 14—1719, Dec. 2; b. Paris. Having been educated in the Sorbonne he entered the Congregation of the Oratory 1657. He early obtained the reputation of a profound familiarity with Scripture and the Fathers; and by several popular ascetical treatises, he attracted so much notice, that, at the age of 28, he was appointed director of the Paris house of his Congregation. It was for the use of the young men under his charge that he commenced the series of his afterward celebrated *Réflexions Morales sur le Nouveau Testament*. The first specimen of this work having been much admired, Q. continued to extend it. Soon afterward, he published an ed. of the works of St. Leo (2 vols. 4to, Paris 1675), which has been much criticised. His residence at Paris, however, was cut short by the disputes about Jansenism. Having refused to sign certain propositions, subscription to which was, by a decree of 1684, required of all members of the Oratory, Q. left the Congregation, and retired to the Low Countries, where he attached himself to the party of Arnauld, in which he speedily rose to the first position of influence and authority. He continued at Brussels his *Réflexions Morales;* and 1693–4, the Reflections on the New Test. were published in a complete form, with approval of Cardinal de Noailles, Bp. of Châlons, and ultimately Abp. of Paris. The work, however, on examination, was found to contain all the most obnoxious doctrines of Jansenius; and Q., having been denounced to the authorities, was arrested, by order of Philip V., and put into prison. He escaped, and betook himself to concealment. But his book was con-

demned, first by the decree of an assembly of the bishops of France, afterward by a decision of Clement XI. 1711, and finally by the celebrated bull *Unigenitus*, 1713, Sep. 8. With this condemnation, the formal dogmatic declarations of the Roman Church on this controversy may be said to have ceased. The controversy continued, but elicited very little that was new. Q. withdrew to Amsterdam, where he lived to the age of 84. Besides *Réflexions Morales*, he left a vast number of treatises, chiefly ascetical. The new dogmatical essays which he published, as well as his critical edition of St. Leo, all are tinged with his peculiar opinions. The *Réflexions Morales* falling in, in the main, with the views of one of the religious parties in the Prot. Church, has been translated into German and English, and was formerly popular in England and in Germany.

QUEST, n. *kwĕst* [F. *quête*; OF. *queste*, quest—from L. *quæsītus*, sought for; *quærĕrĕ*, to seek]: search; inquiry; pursuit; in *OE.*, an inquest; an impanelled jury; examination; inquiry; solicitation. QUESTS, n. plu. in *OE.*, searchers. QUESTANT, n. *kwĕst'ănt*, in *OE.*, a seeker.

QUESTION, n. *kwĕst'yŭn* [It. *questione*; F. *question*, a question—from L. *quæstiōnem*, a seeking—from *quæsītus*, sought; *quærĕrĕ*, to seek]: an interrogatory; something proposed which is to be solved by answer; something requiring examination; examination by torture; inquiry; doubt; subject of dispute or debate; in the British house of commons, an interrogatory addressed by a member to a minister of the crown, or by one member to another; in *OE.*, an endeavor; an effort; the act of seeking: V. to examine by questions; to interrogate; to doubt; to have no confidence in; to inquire: INT. a call to speak to the point in dispute, or to the real matter under debate; also used to imply doubt as to the truth of what is being said. QUEST'IONING, imp. QUEST'IONED, pp. *-yŭnd*. QUEST'IONER, n. *-yŭn-ĕr*, one who interrogates or questions. QUEST'IONABLE, a. *-ă-bl*, that may be doubted; disputable; suspicious. QUEST'IONABLY, ad. *-ă-blĭ*. QUEST'IONABLENESS, n. *-bl-nĕs*, the quality or state of being questionable. QUEST'IONARY a. *-ĕr-ĭ*, asking questions. QUEST'IONIST, n. *-ĭst*, an inquirer: PLU. those in their last college course in the English universities, and about to be examined for honors or degrees. BEGGING THE QUESTION, taking for granted; assuming without proof. IN QUESTION, in debate; under discussion, or in course of examination. LEADING QUESTION, a question that suggests to a person questioned the reply it is desirable to make. OUT OF THE QUESTION, not worthy of consideration; not a matter to be thought of; impossible. PAST QUESTION, beyond question; undoubtedly. PREVIOUS QUESTION; see under PREVIOUS.—SYN. of 'question, v.': to interrogate; catechise; query; ask; inquire; controvert; dispute; doubt;—of 'questionable': debatable; doubtful; suspicious; uncertain; controvertable; disputable.

QUESTOR: see QUÆSTOR.

QUESTRIST, n. *kwĕst'rist* [from *quest*, which see]: in *OE.*, a seeker; a pursuer.

QUETELET, *kā-tlā'*, LAMBERT ADOLPHE JACQUES: Belgian statistician and astronomer: 1796, Feb. 22 - 1874, Feb. 17; b. Ghent. He studied at the Lyceum of Ghent, where, 1814 he became prof. of mathematics. In 1819, he was appointed to the same chair at the Brussels Athenæum; and 1826, was chosen by King William I. to superintend the construction of the Royal Observatory in the cap., of which he became director 1828. In 1836, he was made prof. of astronomy and geodesy at the Brussels Milit. School. Elected a member of the Belgian Royal Acad. 1820, he became perpetual sec. 1834. Q. was besides a corresponding member of the Institut de France and of the Royal Soc. of London. Among his numerous and valuable writings are—*Astronomie Elémentaire* (Par. 1826; 4th ed. Brux. 1848), *Recherches sur la Population, les Prisons, les Dépôts de Mendicité*, etc., *dans le Royaume des Pays-Bas* (Brux. 1827); *Recherches sur la Reproduction et la Mortalité et sur la Population de la Belgique* (Brux. 1832); *Statistique Criminelle de la Belgique* (Brux. 1832); *Sur l'Homme et le Développement de ses Facultés, ou Essai de Physique Sociale* (Par. 1835); *Du Système Sociale et des Lois qui le régissent* (Par. 1848); and *Physique* (1855). Q. was one of the most efficient collaborateurs in drawing up the *Bulletin de la Commission Centrale de Statistique*, the *Annales des Mines*, the *Journal des Economistes*, the *Annales des Travaux Publics*, the *Trésor National*, etc. He also published numerous papers on meteorology, astronomy, terrestrial magnetism, etc., in the *Mémoires* and *Bulletins* of the Belgian Royal Academy.

QUETTA, *kwĕt'tâ*, or SHAWL, accurately spelt *Kwatah*: town in Beloochistan (q.v.), strategically important as being near the head of the Bolan Pass, and close to the Pishin Valley. By treaty 1877, Q. became a British military station. It commands the s. route from India into Afghanistan, secures the Pishin Valley, and keeps several passes open. The valley of Q. is 5,500 ft. above the sea, and is surrounded by mountains 5,000 or 6,000 ft. higher still.

QUETZAL, *kwĕt'sal*, or QUESAL, *kwā'sal* (*Trogon paradiseus*): one of the most resplendent of birds, found in Guatemala, Central America. The native name is from the Aztec or Maya name, Quetzal-tototl, the first word referring to the green feathers, the last meaning fowl. Nothing can exceed the splendor of the twelve long tail plumes of the male—the longest sometimes, 3–3½ ft.—which; with the body above, the throat and breast, are rich green with golden lustre, the beauty of which and of the round crest is enhanced by the thready structure of the plumage. Long lanceolate scapulars drape the wings. The under parts are scarlet. There are about 50 species of Trogons, inhabiting tropical America,

and forming the family *Trogonidæ*. One, the Copper-tailed Trogon (*T. ambiguus*), the middle tail-feathers coppery-green, the outer white and black, is found as far n. as the lower Rio Grande river.

QUETZALCOATL, *ket-säl-kwätl'*: one of the ancient Mexican deities. A vast temple to Q. was built at Cholula by some race which preceded the Aztec, but the latter tribe also worshipped him. The temple was built on an enormous mound. Various allied tribes occupied smaller teocallis in the immediate vicinity, thus making Cholula a central place of worship. Q. was a god of the air, and light, and love—a beneficent deity—who taught the people how to till the soil, develop mines, draw pictures, and maintain a peaceful government. He was represented as a white man, large and tall, with long hair and beard, and dressed in flowing robes. The numerous legends regarding him differ greatly. Among them was one to the effect that from the Atlantic coast, to which he departed, he sent word to his former subjects that at some future time white and bearded men like himself would come to be their rulers. It was probably due to the influence of this tradition that the Spaniards under Cortez 1519 met with so little resistance. Under the names Gucumatz and Cukulcan, having the same meaning as Q. in Aztec, i.e., 'Feathered Serpent,' Q. was accepted as one of the deities of some of the Central Amer. races.

Double-queued.

QUEUE, n. *kū* [F. *queue*, a tail—from L. *cauda*, a tail]: the tie of a wig; in *her.*, the tail of a beast; a cue. DOUBLE-QUEUED, having a double tail, as a lion.

QUEVEDO Y VILLEGAS, *kā-vā'thō ē vēl-yā'gäss*, Don FRANCISCO GOMEZ DE: great satirist, a Spanish classic: 1580, Sep. 26—1645, Sep. 8; b. Madrid. He studied at the Univ. of Alcala de Henares, where he learned Hebrew and Arabic, and other languages. His career, chiefly that of a diplomatist, was marked by numerous vicissitudes. He died at Villa Nueva de los Infantes.

The prose works of Q. are divisible into two classes—the serious and the burlesque. Among the former are *Vision of St. Paul*, *The Spanish Epictetus*, *Phocylides*, *Fortune become Reasonable*, and particularly *The Life of Marcus Brutus*, and *The Policy of God*—the last two of which are remarkable for purity and elevation of sentiment. Among his satirical and burlesque productions, in which his genius finds its happiest expression, the principal are—*The Dream of the Death's Heads*, *The Demon Alguazil*, *Pluto's Stables*, *The Side-scenes of the World*, *The Letters of the Knight of the Forceps*, *Recollections of Student Life*; and *The Grand Sharper, or the History of Don Pablo de Segovia*, a romance of rascaldom, a species of fiction cultivated in Spain at that time, in which the hero is usually an adventurous scamp. The lively sallies, the

piquant allusions, and the happy metaphors in these books have enriched Spanish literature with a crowd of proverbs and colloquial phrases. Q.'s poetry is chiefly humorous. His works have been often reprinted; the most complete ed. is that by Sancho (Madrid, 11 vols. 1791–94); a more recent collection is by Guerra y Orbe (Madrid 1852). An English translation of Q.'s satirical works was published at Edinburgh 1798; his *Sueños*, or Visions, among the most popular of all his productions, were translated into English by Sir Roger l'Estrange (1708).

QUEY, n. *kwā* or *koy* [Dan. *quie*]: in *Scot.*, the female of the ox, generally applied to the young of two years old; a young heifer.

QUEZALTENANGO, *kā-sâl-ta-nâng'yō:* town of Guatemala, Central America, cap. of the dept. of Q. It is 66 m. w. by n. from Guatemala, in an elevated table-land, on a river which flows into the Pacific Ocean. Pop. 30,000.

QUIBBLE, n. *kwĭb'bl* [Bret. *gwiblen*, weather-cock: Gael. *cuibhle*, circular motion: connected with W. *chwip*, a quick flirt or turn—from which *quip*]: a petty or contemptible evasion; a petty cavil; a pretense: V. to evade by artifice, or by a play upon words; to cavil in argument or discourse. QUIB'BLING, imp. QUIB'BLED, pp. *-bld.* QUIB'BLER, n. *-blĕr*, one who acts by trifling evasions; a caviller. QUIB'BLINGLY, ad. *-lĭ.*

QUIBERON, *kē-bĕh-rōng'* or *kē-brōng:* small fishing town of France, dept. of Morbihan, at the extremity of a long slender peninsula, 25 m. s. w. of Vannes. Pop. about 800. It is famous as the spot where a body of French emigrant royalists, under D'Hervilly and Puisaye, landed from an English fleet, 1795, June 27, and endeavored to rouse the people of Brittany and La Vendée against the Convention, but were defeated, and driven into the sea by Gen. Hoche. All the prisoners taken were shot, by order of the Convention. At an earlier period, during the war of the Austrian Succession, an English force attempted a landing here (1746), but was severely repulsed. In 1759, Admiral Hawke completely defeated a French fleet under Admiral Conflans in Q. Bay.

QUICH, v. *kwĭch* [from *quake*, or *quick*, which see]: in *OE.*, to twitch; to move; to stir. QUICH'ING, imp. QUICHED, pp. *kwĭcht.*

QUICHES, *kē'chās:* inhabitants of Guatemala at the time of the coming of the Spaniards: they appear of kin to the Mayas (q.v.), and to have reached a like degree of culture: the compound term Maya-Quiche is collectively applied to the whole stock. Remains of cities built by the Q. are still seen in Guatemala: they resemble the ruins of Copan, and contain mounds, terraces, colossal heads, idols, pillars, and altars. Remains of their aqueducts exist at Rosario, 8 m. s. of Lake Amatitlan and at the foot of the Volcan de Fuego.

QUICHUAS, or QUITOS: Peruvian nation, dwelling originally on the upper courses of the Packachaca and the Apurimac rivers. At the time of the Spanish conquest the Q. were the most numerous of the 6 tribes of Peru subject to the Incas. Their chief seat was Cuzco. Their language, the Quichua, betokened a people advanced in civilization: it had long been cultivated by learned men, and is still the language of the majority of the inhabitants of Peru.

QUICK, a. *kwĭk* [AS. *cwic.*, living: Icel. *quika*, to move: Dut. *quicken*, to shake, to move: Dan. *qvæg*, living, quick: Skr. *jîv*, to live]: done or occurring in a short time; active; sprightly; ready; swift; nimble: AD. speedily; without delay; in a short time; in *OE.*, alive; living: N. the living flesh; sensitive parts or points; a living plant—applied to the hawthorn; in *OE.*, the living, as 'the quick and the dead'; a live animal: V. in *OE.*, to stir; to move. QUICK'LY ad. *-lĭ.* QUICK'NESS, n. *-nĕs*, rapidity of motion; celerity; activity. QUICK WITH CHILD, pregnant with a living child. QUICK-GRASS, or QUICKENS, couch-grass; quitch-grass (see COUCH GRASS). The *Triticum repens*, ord. *Gramin'ĕæ*. QUICK-LIME, recently burnt lime, or lime yet unslaked—so called from its caustic and corrosive qualities. QUICK-MATCH, cotton strands dipped in a composition of white vinegar, saltpetre, and sometimes gunpowder; when lighted, it continues to burn to the end, and hence is useful in exploding mines, etc. The rate at which it burns being known, it is only necessary for safety to take the right length of quick-match. QUICKSAND, a shifting sandbank into which a body readily sinks; unsolid ground; anything deceptive, treacherous, or dangerous (see below). QUICK-SCENTED, a. acute of smell. QUICK-SET, n. a living plant set to grow for a hedge—applied to the hawthorn; the *Crataegus oxyăcan'tha*, ord. *Rosăcĕæ*, particularly when employed as a hedge-plant: ADJ. made of quickset. QUICK-SIGHT'ED, a. *-sīt'ĕd*, acute of sight or perception. QUICK-WIT'TED, a *-wĭt'ĕd*, of ready wit.—SYN. of 'quick, a.': swift; rapid; speedy; expeditious; ready; prompt; active; hasty; brisk; nimble; agile; sprightly; living; alive; lively;—of 'quickness': celerity; expedition; rapidity; swiftness; velocity; fleetness; haste; promptness; dispatch; nimbleness; agility; briskness; liveliness; sagacity; penetration; keenness; sharpness; shrewdness.

QUICKEN, v. *kwĭk'n* [from QUICK, which see]: to make alive; to become alive; to revive or resuscitate; to increase the speed or velocity of; to hasten; to sharpen; to stimulate; to incite; to reinvigorate; to move with activity; to be in the state of pregnancy when the child's life begins. QUICKENING, imp. *kwĭk'nĭng.*: ADJ. giving life to; inciting; reviving: N. the first felt motion of the fetus in the womb. QUICKENED, pp. *kwĭk'nd.* QUICKENER, n. *kwĭk'nĕr*, one who or that which quickens.—SYN. of 'quicken': to vivify; invigorate;

revive; resuscitate; refresh; stimulate; sharpen; incite; hasten; dispatch; speed; accelerate; expedite; actuate.

QUICKSAND [Eng. *quick*, meaning *live*, and *sand*]: sand readily moved, or easily yielding to pressure: specifically a large mass, consisting mostly of sand, but also of silt or argillaceous matter so intimately mixed with water as to be semi-fluid, and having all the properties of a fluid, but in a minor degree. A familiar instance of a quicksand is seen when the sand on a beach is kept 'alive' and mixed with water, soil, and organic matter by the action of springs rising from beneath. In general the tendency of silty sand is to form a compact, firm body, having apparently none of the properties of a quicksand; but this very sand, when its surface is disturbed by mechanical violence, as by the waves, will to a certain depth become a Q. The grains of sand become so intimately mixed with the water, that the mingled mass of sand, silt, and water becomes a semi-fluid.

The extent to which a mass of sand is capable of becoming a quicksand depends on the fineness of the sand and the proportion in which it is mixed with silt or argillaceous matter. If the sand be sharp and clean, whether coarse or fine, it has very little of the nature of Q.; but if it be in a state of fine division and at the same time mixed with silt, etc., the particles will be readily held in suspension by the water, and it may form a deep Q. If a vessel be left upon such a Q. by a falling tide, it will sink considerably into it, and the sand will form a complete 'seal' around the bottom; at the rise of tide the vessel will not float when the water has reached the ordinary flotation level, but a considerable time will elapse before the water can communicate sufficient of its pressure through the seal of sand to float her; meantime the water rises far above the ordinary flotation level. Floating in water, a vessel is sustained by virtue of the vertical components of the water-pressure; but if the bottom of the vessel rests on a Q. it is partially protected from the action of the water by a semi-fluid, which is not capable of transmitting the full hydraulic pressure of the medium of flotation. Hence an effectual way of releasing a ship from a Q. would be by forcing water through holes in the bottom, thus breaking the 'seal' of mingled sand, silt, and water, and re-establishing the full hydraulic pressure. In sinking shafts and laying the foundations of bridge piers, one of the most formidable obstacles is the presence of Q., but by the use of freezing mixtures the difficulty may be obviated. To apply the freezing mixture, a row of vertical tubes is driven into the Q. a short distance apart, and just outside the circumference of the desired opening or shaft. When the freezing mixture is driven into the tubes, the Q. gradually solidifies into a firm, hard wall, of sufficient strength to retain its shape while the inclosed shaft is being excavated and lined. This method

has often been used in bridge work; and recently it has been successfully employed in sinking shafts in the Lake Superior ore-mining region, where strata of thin Q. have been encountered some distance below the surface. A more recent method of overcoming the same obstacle is that proposed by a German engineer, Frederick Neukirch, of Bremen. Instead of freezing the Q., Neukirch, by the aid of compressed air, forces through pipes and into the Q. a quantity of cement, which, mixing with the sand and water, forms a firm mass.

QUICKSILVER, n. *kwĭk'sĭl-vẽr* [*quick*, in the sense of living, and *silver*]: the familiar term for fluid mercury, in allusion to its mobility and silver-white color (see MERCURY). QUICK'SILVERED, a. *-sĭl'vẽrd*, overlaid with quick-silver. QUICKSILVER HORIZON, a shallow trough of quicksilver to form an artificial horizon, used for observing altitudes.

QUID, n. *kwĭd* [AS. *cwd*, what is chewed—from *cowan*, to chew: in Surrey, *quid*, what is chowed (see CUD)]: a piece of tobacco rolled about in the mouth, like a cow chewing the cud: V. to drop food from the mouth when partly masticated; said of horses. QUID'DER, n. a very old horse, which lets the hay or grass fall which he has half chewed.

QUIDDITY, n. *kwĭd'ĭ-tĭ* [mid. L. *quidditas*, the *whatness* or distinctive nature of a thing, a byword introduced by the nice distinctions of the schools—from L. *quid*, what: F. *quidditi*; It. *quidità*, quiddity]: a subtility or nice refinement; a trifling nicety; a captious question.

QUIDNUNC, n. *kwĭd'nŭngk* [L. *quidnunc*, what now?]: a term of contempt applied to one who is curious to know everything that passes; one who pretends to know all occurrences.

QUID PRO QUO, *kwĭd prō kwō* [L. what for what]: one thing for another; in *law*, an equivalent.

QUIESCE, v. *kwī-ĕs'* [L. *quiescĕre*, to rest or keep quiet—from *quiēs*, rest]: to be silent, as a letter. QUIES'CING, imp. QUIESCED', pp. *-ĕst'*. QUIES'CENT, a. *-sĕnt* [*quies'cens* or *quiescen'tem*, resting, reposing]: resting; being in a state without motion; calm; unruffled, as the mind; silent; not sounded, as a letter: N. a silent letter. QUIES'CENTLY, ad. *-lĭ*. QUIES'CENCE, n. *-sĕns*, rest; state of being without motion; a state of the mind free from agitation or emotion; silence.

QUIET, a. *kwī'ĕt* [F. *quiet*, quiet—from L. *quiētus*, enjoying rest, quiet—from *quiēs* or *quiētem*, rest: It. *quieto*]: calm; still; free from motion, disturbance, or alarm; without noise or resistance; unruffled; smooth; not noisy or restless: N. repose; stillness; freedom from disturbance or alarm; peace; security: V. to still; to calm; to pacify; to allay or suppress. QUI'ETING, imp.: ADJ. reducing to stillness; appeasing; tranquillizing. QUI'ETED, pp. QUI'ETER, n. *-ẽr*, one who or that which

quiets. QUI'ETLY, ad. *-lĭ*. QUI'ETNESS, n. *-nĕs*, the state of being quiet; stillness; calmness; tranquillity. QUI'ETISTS, n. plu. *-ĭsts*, mystics, who hold that the soul, in the pursuit of the supreme good, must retire from the reports and gratifications of sense, and in silence be absorbed in contemplation of God (see below). QUI'ETISM, n. *-ĭzm*, spiritual tranquillity, or inactive contemplation; tenets of the Quietists. QUI'ETIS'TIC, a *-ĭs'tĭk*, pert. to quietism. QUI'ETSOME, a. *-sŭm*, in *OE.*, calm; undisturbed; still. QUI'ETUDE, n. *-ūd*, rest; repose. QUIETUS, n. *kwī-ē'tŭs* [L.]: rest; repose; death; final discharge; a severe blow. QUIE'TUS EST, *ĕst* [L. he is quiet]: a term used in the exchequer on giving an accountant a discharge or acquittance. IN QUIET, quietly; peacefully. OUT OF QUIET, in *OE.*, disturbed restless. —SYN. of 'quiet, a.': still; calm; peaceable; tranquil; placid; inoffensive; peaceful; mild; unmoved; smooth; unmolested; unruffled; undisturbed; contented; meek; —of 'quiet, n.:' rest; tranquillity; peace; security; stillness; repose; calmness; ease.

QUI'ETISTS: numerous class of mystical sects, who, in different ages, have held that the most perfect state of the soul is a state of quiet, in which the soul ceases to reason or to reflect about itself or God, and, in a word, to exercise any of its faculties—its sole function being passively to receive the infused heavenly light, which, according to their view, accompanies this state of inactive contemplation. For the doctrines of the Q., see FÉNELON, FRANÇOIS DE SALIGNAC DE LA MOTHE: GUYON, JEANNE MARIE BOUVIÉRES DE LA MOTHE: MOLINOS, MIGUEL DE: HESYCHASTS: MYSTICS: MYSTICISM: BRETHREN AND SISTERS OF THE FREE SPIRIT: BEGUINES. Some of their doctrines are purely speculative, involving little of practical consequence whether for good or for evil. Many of those holding these tenets and practicing on them were saintly and faithful souls, seeking in Quietism a refuge or the spiritual life from the suffocating influence of a worldly church and of a religion which had become almost a mere round of formal observances. But there is one most pernicious class of errors, which, however eschewed by the leaders of the various schools, has seldom failed to characterize the practical working of the system among the vulgar crowd of its followers. From the belief of the lofty and perfect nature of the purely passive state of contemplation, there is but a single step to the fatal principle in morals, that in this sublime state of contemplation all external things become indifferent to the soul which is thus absorbed in God; that good works, the institutions of religion, and prayer, are not necessary, and hardly even compatible with the repose of the soul; nay, that so complete is the self-absorption, so independent is the soul of corporeal sense, that the most criminal representations and movements of the sensitive part of the soul, and even the external actions of the body, fail to affect the contemplating soul, or to impress it with their

debasing influence (see some of the titles instanced above). The chief Quietist sects have been the Messalians or Euchites, 4th c.; the Begonnili, 11th c.; the Beghards and Beguines, 13th c.; the Hesychasts, in the East, about the same period; the Brethren of the Free Spirit 14th c.; followers of Michael Molinos, 17th c.; and others of less note. See Heppe, *Geschichte der Quietistischen Mystik* (1875).

QUILIMANÉ, *kē-lē-mā-nā':* seaport, dist. of Q., province of Mozambique, State of East Africa (known as the colony of Mozambique prior to 1891, Sep. 30); 15 miles from the mouth of the Q. river, the n. arm of the Zambesi delta. It is in a swampy, unhealthful region; was founded in the 15th c.; for a long time had large trade in ivory and slaves; and now has an import and export trade, chiefly with Nyassaland, of over $1,000,000 annually, comprising cotton, coal, hardware, breadstuffs, ivory, rubber, copal, wax, and oil-seeds. River traffic has declined since the discovery of the Chinde branch of the delta 1889. Pop. about 6,000.

QUILL, n. *kwil* [Ger. *kiel*, a stalk or quill: Gael *cuile*, a reed, a stalk: Dan. *kogle*, a fir-cone: F. *quille*, a skittle, the keel of a ship: Bret. *kigel*, a distaff: comp. L. *caulis*; Gr. *kaulos*, a stalk or stem]: one of the large strong feathers of the wing of a bird, used in making pens for writing (see QUILLS): an instrument for writing; the spine of a porcupine; the piece of reed on which weavers wind the thread which is to form the woof of cloth: V. to plait or form with small quill-like ridges; to wind on a quill, as thread or yarn. QUILLING, imp.: N. a narrow border or trimming of lace and the like, somewhat resembling a row of quills. QUILLED, pp. *kwild:* ADJ. in *her.*, term used in describing a feather, to indicate that the quill differs in tincture from the rest. QUILLWORK, n. a sort of embroidery with pieces of flattened quills.

QUILLAIA, *kwil-lā'ya:* genus of plants of nat. order *Rosaceæ*, type of a tribe called *Quillaieæ*, with herbaceous calyx-tube, capsular fruit, and seeds winged at the apex. The sub-order is remarkable for saponaceous secretions. The bark of some species of *Quillaia*, *e.g.*, *Q. saponaria* and *Q. Brasiliensis*, are used in S. America, under the name *Quillai*, as a substitute for soap. They contain a substance closely allied to *Saponine*.

QUILLET, n. *kwil'et* [L. *quid'libet* for *quodlibet*, all and every, which you please]: in *OE.*, a turn or perversion in argument; subtilty; fraudulent distinction; petty cant. *Note.*—QUILLET was a question in the schools where the challenged could choose his side.

QUILLOTA, *kēl-yō'tā:* town; province of Valparaiso, Chili; on the Aconcagua river; 22 m. n.e. of Valparaiso City. It is one of the oldest towns in the country; was formerly noted for its gold-washings; and is now principally engaged in the mining and shipment of copper. Pop. about 12,000.

QUILLS: the large feathers of the wings of birds, the hollow tubes of which, being properly cleaned of all oily or fatty matter, and dried, were formerly used for making pens to write with. Steel and gold pens have now largely taken the place of quill pens. Those plucked from geese are most used, but swan and turkey-quills also are employed; and for very fine writing, and for pen-and-ink drawing, crow-quills are preferred. After the quills have been carefully scraped and cleaned, the drying is effected by gentle heat in ovens, by which they acquire a necessary brittleness in a longitudinal direction, without which property the fine slit could not be made, on which the whole working character of the pen depends.

QUILLWORT, *kwĭl'wĕrt* (*Isoetes*): genus of the club-moss family, *Lycopodiaceæ;* unlike our other genera, it is aquatic, with a corm instead of stem, and long awl-shaped or linear angular leaves, which contain 4 air-tubes, cross-partitioned, and bear, sessile in their axils, round or plano-convex sporocarps, those of the outer leaves filled with macrospores, those of the inner with powdery microspores. *I. lacustris* (found also in Europe) is found northward; has macrospores as large as $\frac{1}{36}$ in. covered with twisted ridges. *I. Engelmanni*, Mass. to Del. and Mo., is much the largest species, with 50–100 leaves, 9–20 inches long, its variety *Valida* still larger. 17 species and varieties in the United States are described.

QUI'LOA: see KILWA.

QUILON, *kwē-lŏn'* (*Kayan Kulan*): town of India, in the state Travancore, 35 m. n.w. from Trivanderam. It is on the sea-coast, in a bight where ships may anchor and have shelter. Q. has a barrack for European troops, a hospital, a jail, etc. There is export trade in timber, cocoa-nuts, ginger, pepper, etc. Communication with Trivanderam, as with towns further n. on the coast, is almost entirely by canals, connecting the lagoons of the *back-water*. Pop. estimated about 20,000.

QUILT, n. *kwĭlt* [W. *cylch*, a hoop; *cylched*, what goes round about or enwraps: Gael. *coilce*, bed-clothes; *cuil*, a corner; *cailleach*, a bedroom, a bed-cover: L. *culcĭta*, a mattress: Dut. *kulckt;* It. *coltre;* OF. *cuilte;* F. *coultre*, a quilt]: a thick cover for a bed, formed by stitching one cover over another with some soft substance or stuffing between; any thick or warm coverlet: V. to stitch two piles of cloth, one over the other, with some soft stuffing between. QUILT'ING, imp.: N. the act of making a quilt; that which is quilted; the materials for bed-quilts, bed-covers, and the like. QUILT'ED, pp.: ADJ. formed as a quilt, or into a quilt.

QUIMPER, *kăng-pār':* old town of France, cap. of the dept. of Finistère; prettily situated on the Odet, about 9 m. from its mouth, about 35 m. s.e. of Brest. Its cathedral, a stately, richly-carved, and ornamented edifice, commenced 1424, is the principal building. Potteries are in operation, also tan-yards, breweries, etc.; and sardine-fishing is carried on. Pop. (1886) 17,171.

QUIN, *kwin*, James: 1693, Feb. 24—1766, Jan. 21; b. London, of Irish descent. He made his first appearance on the stage 1714 at Dublin as Abel in *The Committee*. Shortly afterward he went to London, where he was engaged at Drury Lane, but for inferior parts. In 1716 the sudden illness of a leading actor led to Q.'s being called on to sustain the character of Bajazet in the famous play of *Tamerlane*. His success was marked. Next year, he exchanged Drury Lane for Rich's Theatre at Lincoln's Inn Fields, where he remained as a principal actor 17 years. His reputation was clouded for a time by a duel in which he killed a brother-actor. The only really fine parts which he seems to have played were Captain Macheath in the *Beggars' Opera*, and Falstaff in the *Merry Wives of Windsor*. In 1734–5, he returned to Drury Lane Theatre, 'on such terms,' says Cibber, 'as no hired actor had before received;' and from this date until the appearance of Garrick 1741, he was, by universal consent, the first actor in England. Q. was not pleased at the rising fame of Garrick, and sarcastically expressed his chagrin by declaring that 'Garrick was a new religion, and that Whitefield was followed for a time; but they would all come to church again.' In this he erred. In 1751, he withdrew from the stage as a hired actor, though he continued at intervals to give his services for benevolent purposes, and fixed his residence at Bath, where he died. In after-dinner conversation, he was a notable though coarse story-teller, and many of his jests are still in vogue.

QUINARY, a. *kwī'nēr-ī* [L. *quīnārius*, containing five: *quīnī*, five—from *quinquē*, five]: consisting of five, or of a multiple of five.

QUINATE, a. *kwī'nāt* [L. *quīnī*, five each—from *quinquē*, five]: in *bot.*, applied to five similar parts arranged together, as five leaflets coming off from one point.

QUINCE, n. *kwins* [F. *cognasse*, pear-quince: It. *cotogna*; L. *cotōnia*, a quince; *Cydōniă*, a town in Crete, whence they are said to have come], (*Cydonia*): genus of trees and shrubs of nat. order *Rosaceæ*, sub-order *Pomeæ* nearly allied to *Pyrus*, with which many botanists have united it, but distinguished by having many instead of two seeds in each cell, and by their very mucilaginous nature. Q. denotes also the fruit. The Common Q. (*C. vulgaris*), native of s. Europe and temperate parts of Asia, is a low tree, with generally tortuous branches; ovate, entire, deciduous leaves, downy on the under side; and rather large whitish flowers, solitary at the extremity of young branches. The fruit is in some varieties globose; in others, pear-shaped, of a rich yellow or orange color, with strong odor. It is hard and austere, but when stewed with sugar, becomes extremely pleasant, and is much used in this way either alone or to impart a flavor. It is much used also for a preserve called *Quince Marmalade*. A delicious beverage, somewhat resembling cider, is made from it. The seeds

readily give out their mucilage to water, so that they turn 40 or 50 times their weight of water into a substance as thick as syrup. Q. mucilage, or Q. gum, *Cydonin*, is allied to Bassorin, but differs from it in being readily soluble in water, while it differs in some particulars also from Arabin. See GUM.—The Q. was cultivated by the ancient Greeks and Romans, and is now cultivated in the United States, England, s. Europe, and generally in temperate climates. The Q. is propagated principally by layers and cuttings (see NURSERY). It thrives in a variety of soils, but succeeds best in rich and moist, though well-drained, loams. Trees from the nursery may be set when three or four years old. The Q. naturally grows in the form of a shrub, with several stalks, but on account of the difficulty of protecting from borers it is often grown with a single stem. The trees should be 6

Common Quince (*Cydonia vulgaris*).

to 12 ft. apart each way according to the variety, and the richness of the soil. Good cultivation should be given till mid-summer. Rich composts may be profitably applied late in autumn or very early in spring. Ground bones, and fertilizers rich in potash, will increase the quantity and improve the quality of fruit. The principal pruning required is to remove suckers from the stems or roots, and to keep the heads in suitable form. When the fruit turns yellow, it should be carefully picked by hand. The Q. grows from 8 to 20 ft. high. It should produce fair crops of fruit in five years from planting, and remain fruitful about 40 years. The ends of the twigs are sometimes destroyed by the twig-blight. When this appears, the affected shoots should be cut off and burned. Borers often prove very destructive. They should be promptly cut out, or be destroyed by passing a wire into the channels that they have made. As a preventive measure, to keep the insects from laying eggs on the shrubs, the trunks may be frequently washed in June with a mixture of one gallon soft soap and one pint crude carbolic acid mixed with one gallon of hot water, and, when well combined (in 12 to 24 hours), thinned

with eight gallons of soft water. Among the best varieties are the Champion, Meech's Prolific, Orange, and Rea's Seedling. The Q. is largely used as a stock for dwarfing the pear by grafting.—Two ornamental varieties of the Q. are grown to some extent. The Chinese Q. (*P. Sinensis*) has glossy leaves, showy flowers with a violet odor, and yellow fruit of inferior quality. It is not entirely hardy in cold regions. The Japan Q. (*C. Japonica*), often sold as *Pyrus Japonica*, is hardy and bushy, with many thorns; it bears beautiful crimson flowers early in the spring, makes a fine hedge, and is one of the best hardy spring-flowering shrubs.

QUINCH, v. *kwĭnsh:* same as QUICH, which see.

QUINCUNX, n. *kwĭng'kŭngks* [L. *quincunx*, five-twelfths, the form of a quincunx—from *quinqui*, five; *uncĭă*, a twelfth part, a bit or atom]: an arrangement of five objects in a square, one at each corner, and one in the middle; in *bot.*, the arrangement of the leaves of a bud into five, of which two are exterior, two interior, and the fifth covers the interior with one margin, and has its other margin covered by the exterior. QUINCUNCIAL, a. *kwĭn-kŭn'shal*, arranged in a quincunx. QUINCUN'CIALLY, ad. *-lĭ*.

QUINCY, *kwĭn'zĭ*: city; cap. of Adams co., Ill.; on the Mississippi river and the Burlington Route, the Q. Omaha and Kan. City, and the Wabash railways; 104 m. w. of Springfield, 264 m. s. w. of Chicago; 7 sq. m. It is on a limestone bluff 120 ft. above the river, and is laid out regularly, the streets running n. and s. being 3 m. long, and those running e. and w. 2¾ m. It is supplied with water from the river, the distribution being from a reservoir 230 ft. above tidewater, and has an improved sewerage system, electric lights, electric street railways, a railway bridge across the river, over 80 m. of improved streets, and 4 public parks. The public buildings include the U.S. govt. building (cost $250,000); co. court house (cost $300,000); city-hall (cost over $100,000); the State Soldiers' and Sailors' Home, comprising a group of 50 separate buildings; and the Public Library. There are 33 churches; public school property valued at $250,000, including 10 buildings; Chaddock College (Meth. Episc., chartered 1876); St. Francis Solanus College (Rom. Cath., opened 1860); 13 parochial schools; 3 national banks (cap. $550,000), a state bank (cap. $300,000), and a private bank. In 1894 the assessed valuations were: Real property, $3,497,664; personal, $1,287,935—total $4,785,599; and the tax rate was $68.75 per $1,000. The total funded debt 1895, Mar. 1, was $1,467,300; sinking funds, $50,000; net debt, $1,417,300. Q. has a large river and railway trade extending over several states. In 1890 it had 394 manufacturing establishments, which employed $6,554,810 capital and 5,110 persons, paid $2,429,834 for wages and $5,701,973 for materials, and had an output valued at $10,395,102. The principal industries, according to the value of output, were the manufacture of flour and grist-

mill products, $1,768,501; foundry and machine-shop products, $1,157,817; carriages and wagons, $600,762; chewing and smoking tobacco and snuff, $578,500; malt liquors, $398,140; and planing-mill products, $293,700. The output of slaughtering and meat-packing was valued at $656,321. Q. was settled 1822 and incorporated 1839. Pop. (1880) 27,268; (1890) 31,494; (1895) estimated, 35,000.

QUINCY: city; Norfolk co., Mass.; on the Q. river and bay and the Old Colony Division of the New York New Haven and Hartford railroad; 1½ m. from the Atlantic Ocean, 8 m. s.e. of Boston. It was settled 1625 by Capt. Wollaston, who named it Mt. Wollaston, and was incorporated as a town, receiving its present name in honor of Edmund Quincy (q.v.), after being set off from Braintree, 1792. The town comprised the villages of Q. Point, Atlantic, Wollaston, West Q., South Q., Squantum, Germantown, and Houghsneck. In 1888 the town with its entire area was chartered as a city. It is noted for its extensive granite quarries, chiefly in w. Q., from which stone for many well-known public buildings in all parts of the country has been shipped, and as being the birthplace of John Hancock and Presidents John Adams and John Quincy Adams. It also has a lasting interest from the fact that the first railway in the United States, nearly 3 m. long, was constructed here 1826, at a cost of $30,000, to carry stone from the quarries, for the Bunker Hill monument, to the Neponset river. The city contains 14 churches, viz.: Bapt., 5; Rom. Cath., 3; Congl., 2; Meth. Episc., 2; and Luth. and Univ., each one; public high school (building completed 1894, cost $60,000); 97 grammar and dist. schools; 3 evening schools; the Adams Acad.; the Thomas Crane Public Library; 2 national banks (cap. $300,000); a savings-bank (deposits $1,726,066); Faxon and Merry Mount parks; 5 large public squares. In 1894 the assessed valuation was $16,817,455; the debt (including water bonds aggregating $714,000), $1,103,730; amount of tax levy, $307,827; and tax rate, $17.60 per $1,000. The debt showed an increase of over $38,000, caused by the new water system, and, excepting this special expenditure, a rapid decrease in the general aggregate. Pop. (1880) 10,570; (1890) 16,723; (1894) est. 20,000.

QUIN'CY, EDMUND: statesman; 1681, Oct. 24—1738, Feb. 23; b. Braintree (now Quincy), Mass; grandson of Lieut.-Col. Edmund Q., and great-grandson of Edmund Q., one of the founders of Braintree, who came to this country 1628, and who was a descendant of the Quincys, Earls of Winchester in the 13th c. Q. graduated at Harvard 1699, and soon became a representative from Braintree, and later a member of the council. He was also lieut.-col. of a regt. of militia. In 1718 he was made a judge of the supreme court, which position he held until his death. In 1737 he was appointed agent for Mass. in England for settlement of the boundary between that state and N. H. Soon after reaching London he was attacked with small-pox which proved fatal.

QUIN'CY, JOSIAH: lawyer; 1744, Feb. 23—1775, Apr. 26; b. Boston. He graduated from Harvard College 1763, and took the degree A.M. three years later, delivering an address on patriotism which made him famous as an orator. He studied law, soon became eminent in his profession, and was prominent in political affairs, also both as a public speaker and as a writer for the press. After the Boston massacre, he was, with John Adams, employed as counsel for the commander and the soldiers who had fired on the crowd. For accepting this case he was severely blamed by the patriots, and his father wrote an angry letter condemning his course. Q. replied that he believed it to be his duty to give professional assistance to men who were accused, but were not proven guilty of crime; and added, 'To inquire my duty and to do it, is my aim.' The men were acquitted, and after a few years the course pursued by their lawyers was generally approved. Though his business became very extensive, he wrote many political pamphlets and articles which had great influence. Sooner than most of his compatriots he recognized the fact that the revolution was inevitable. In 1774, Sep., he sailed to England on a mission of the patriots to their friends in that country. He died on the return voyage when within sight of his native state. He published *Observations on the Act of Parliament commonly called the Boston Port Bill* (1774). His *Life*, by his son, has passed through three editions.

QUIN'CY, JOSIAH: American lawyer, orator, and man of letters: 1772, Feb. 4—1864, July 1; b. Boston; son of Josiah Q., distinguished orator of the revolution. He graduated at Harvard College 1790; studied law; was active in politics as a leading member of the federal party in New England; entered congress 1805, where he became distinguished as a ready, earnest, and fervent orator, in opposition to the policy of Jefferson and Madison. He was one of the earliest to denounce slavery in congress, and declared the purchase of Louisiana a sufficient cause for dissolution of the union. Disgusted with the triumph of the democratic party and the war of 1812, he declined re-election to congress, and turned to scientific agriculture. He became, however, a member of the Mass. senate, and 1822 judge of the municipal court of Boston. In 1823, he was elected mayor of Boston; and 1829–45 was pres. of Harvard College, which was notably advanced under his administration. Among his published works are a Memoir of his father, 1825; *History of Harvard University*, 1840; *History of the Boston Athenæum*, 1851; *The Municipal History of the Town and City of Boston*, 1852; *Life of John Quincy Adams*, 1858; *Essays on the Soiling of Cattle*, 1859. Born before the American revolution, in which his father took an active and distinguished part, he lived to denounce the secession of the Confederate states in 1860, and to urge on the war for their subjugation. He died at Quincy, Mass.

—His son, JOSIAH Q. (1802-82, b. Boston) graduated at Harvard 1821, and was mayor of Boston 1845-49.—Another son, EDMUND Q. (1808-77), was a distinguished author and orator, and an active member of the abolitionist party.

QUINDECAGON, n. *kwĭn-dĕk'ă-gŏn* [L. *quinquĕ*, five; Gr. *deka*, ten; *gōnĭă*, an angle]: in *geom.*, a plane figure having 15 sides and 15 angles.

QUINDECEMVIR, n. *kwĭn'dē-sĕm'vĕr* [L. *quin'dĕcim*, fifteen; *vir*, a man]: in *anc. Rome*, one of a college or board of fifteen priests who had the charge of the Sibylline Books, and of religious affairs generally: PLU. QUIN'DECEM'VIRI, *-vĭr-ī*. QUIN'DECEM'VIRATE, n. *-vī-rāt*, the body of fifteen priests, or their office.

QUINET, *ke-nā'*, EDGAR: French author: 1803, Feb. 17—1875, Mar. 27; b. Bourg, dept. of Ain. He studied at Lyon and Paris. He made his literary *début* at the age of 20 with *Tablettes du Juif Errant*, after which his love of philosophy and mystic reverie led him to Germany. He studied at Heidelberg, and on his return to France published a translation of Herder's *Ideen zur Philosophie der Geschichte der Menschheit*, so well executed, that Cousin signalized it as 'the *début* of a great writer.' From this early period dates his intimate friendship with Michelet (q.v.), the result of a community of feeling and belief. Q. was a member of the scientific commission sent to the Morea 1828, and there gathered materials for his *Grèce Moderne et ses Rapports avec l'Antiquité* (Par. 1830). Although his political enthusiasm was extremely ardent, he continued unabated his literary labors, and became a contributor to the *Revue des Deux Mondes*, in which *Ahasuerus*, perhaps his finest work, first appeared. 1839-42, he held the chair of foreign literature at Lyon, where his lectures on the ancient civilizations excited profound interest. Thence he passed to the chair of *littératures méridionales* at the College of France, instituted for him by Villemain; and here, in company with Michelet, he assailed the Jesuits with a keen, earnest, epigrammatic eloquence that startled the chiefs of that body, and made even the government nervous, in view of the peril of exposure to their secret hostility. In 1846, Q. was silenced. He threw himself eagerly into the Reform agitation that brought about the revolution of 1848, and was elected a member of the constituent and legislative assemblies, where he always voted with the Extreme Left; but was expelled from France after Dec. 2. On the fall of the empire, Q. returned to France, and was reinstalled in his chair at the College of France, 1870, Nov. In 1871 he was elected a member of the assembly. Among his chief works are *Allemagne et Italie* (1839); *Histoire de la Poésie Épique* (1836-7); *Le Génie des Religions* (1842); *Les Jésuites*, with Michelet (1843); *Les Révolutions d'Italie* (1848); *Merlin l'Enchanteur* (1860); *La Campagne de* 1815 (1862). An ed. of Q.'s *Œuvres Complètes* appeared 1878.

QUINIA: see QUININE.

QUIN'IC ACID: see KINIC ACID.

QUININE, n. *kwī'nin* or *kwī-nīn'* or *kwī'nēn'*, or QUINIA, *kwin'i-a*, or QUINA, *kwī'nā*, or QUININA, *kwin'i-nā* [F. *quinine*, quinine: Sp. *quina*, Peruvian bark—from *cinchona*, the Peruvian bark, said to be named from the Countess of *Cinchon*, wife of a viceroy of Peru, who was cured by its bark]: one of the alkaloid proximate principles in which the medicinal virtues of the Peruvian bark reside, highly valued in the treatment of agues, etc., and for its tonic properties (see below). QUINICINE, n. *kwin'i-sin* (see QUININE, below). QUINIDINE, n. *kwin'i-dīn* (see QUININE, below).

QUININE, or QUIN'IA: and the other CINCHONA ALKALOIDS: alkaloids obtained from the barks of different varieties of S. Amer. *Cinchona* employed in treatment of disease (see CINCHONA). These alkaloids or organic bases occur in combination with quinic and quinotannic acids. Of these bases, the most important are quinia and cinchonia, each of which is accompanied by (or connected with) two isomeric bases, termed respectively *Quinidina* and *Quinicina*, and *Cinchonidina* and *Cinchonicina*; and besides these, a base termed *Aricina* or *Cinchovatina* occurs in the bark of *Cinchona ovata*. Here are described (1) the *chemical characters*, (2) the *therapeutic action* of these alkaloids.

1. *Quinine* ($C_{20}H_{24}N_2O_2$) is characterized by the following properties. It crystallizes with six atoms of water, in the form of silky needles, from an ethereal or alcoholic solution allowed to evaporate spontaneously in a cool place; but when thrown down from acid solutions, it forms a white curdy precipitate. It is comparatively insoluble in water, requiring about 200 parts of boiling water for its solution, but dissolves readily in alcohol and in ether, and in water acidulated with a mineral acid. It has intensely bitter taste, perceived chiefly at the back of the mouth; it has a well-marked alkaline reaction. It combines with acids, and forms both neutral and acid salts, most of which are capable of crystallization, and all possessing its own bitter taste. Of these salts, the acid ones are far the most soluble.

The most important of its salts is the *neutral sulphate* (formerly mistakenly termed the disulphate), represented by the formula $(C_{20}H_{24}N_2O_2)_2.H_2SO_4 + 7\frac{1}{2}H_2O$. It crystallizes in long snow-white silky needles, sparingly soluble in water (yet imparting to it a peculiar bluish tint), but dissolving freely in diluted sulphuric acid and in alcohol. The *acid sulphate*, $(C_{20}H_{24}N_2O_2)_2.H_2SO_4 + 8H_2O$, also is crystallizable; and the crystals, when dried for some time at a temperature of 212° F., are phosphorescent. Its solution, or an acidulated solution of the former salt, exhibits striking phenomena of *Fluorescence* (q.v.). By heating a solution of sulphate of Q. with strong acetic acid, and adding, drop by drop, an alcoholic solution of iodine to the hot solution, are obtained crys-

tals of a compound (herapathite) represented by the formula $(C_{20}H_{24}N_2O_2)_4.3SO_4H_2.I_2 + 3H_2O$. These crystals, formed in large flat rectangular plates, present very remarkable optical properties, polarizing light as perfectly as plates of tourmaline.

This alkaloid may be obtained from several species of cinchona, but is most abundant in the yellow-bark (*C. cardifolia*). The pulverized bark is boiled with water containing 1 per cent. of oil of vitriol, which dissolves the bases that are present; the solution is precipitated by sodium carbonate, and the Q. (with the other alkaloids) extracted from the precipitate by ether. For various methods of obtaining the sulphate of Q. on a large scale for medicinal purposes, see Pereira's *Materia Medica* II., part 2, 147–149; and *British Pharmacopeia*. The mother liquid from which sulphate of Q. has been obtained, contains considerable quantity of a resinous amorphous substance known as *Quinoidine*, which, when treated with ether, yields crystals of *Quinidine* $(C_{20}H_{24}N_2O_4 + 2H_2O)$, a base isomeric with Q., from which again is derived another isomeric base, *Quinicine*.

Cinchonia $(C_{20}H_{24}N_2O)$ crystallizes in comparatively large quadrilateral prisms, which are anhydrous. It is less soluble than Q. in alcohol, and is insoluble in ether, and this difference of solubility affords the means of separating these two alkaloids. With acids it forms two series of salts similar to, but more soluble than, those of quinia. These salts are intensely bitter, and possess (though in less degree) the same therapeutic properties as quinia. In certain varieties of cinchona bark, a crystalline alkaloid, *Cinchonidine*, isomeric with cinchonia, occurs. On exposing its salts, or those of cinchonia, to high temperature, corresponding salts of *Cinchonicine* are formed. The last-named substance has the same composition as the two preceding ones, and is precipitated from its salts in the form of a resinous mass. Cinchonia and its isomeric allies are most abundant in the pale Peruvian Bark (*Cinchona condaminia*). The method of obtaining cinchonia is precisely the same as for obtaining quinia. When both bases are present, they may be separated by converting them into sulphates; the salt of Q. is the least soluble, and crystallizes first.

The relations of the above-described alkaloids to polarized light have been carefully studied by Pasteur, and are very remarkable. Their respective effects on the plane of polarization are as follows: Q. produces a powerful left-handed rotation; quinidine produces a powerful right-handed rotation; quinicine produces a feeble right-handed rotation; cinchonia produces a powerful right-handed rotation; cinchonidine produces a powerful left-handed rotation; cinchonicine produces a feeble right-handed rotation. The action of these alkaloids thus affords an excellent illustration of the importance of circular polarization as an aid to chemical analysis. De Vry and Alluard published some time ago

a *Report*, in which they state that the polariscope reveals the presence of impurities in Q. when too small to be detected by any chemical process.

2. The only preparations of the above-described alkaloids included in the *U. S. Pharmacopœia* are the *Sulphate of Quinia*, the *Compound Tincture of Quinia* (merely a solution of the sulphate in tincture of orange-peel in the proportion of one grain to a fluid drachm), and the *Citrate of Iron and Quinia*. Sulphate of Q. is liable to adulteration; and specimens are frequently met containing gypsum, chalk, magnesia, gum, starch, boracic and stearic acids, sugar, salicine, and sulphate of cinchonia. The first five may be detected by their insolubility in alcohol; boracic acid by the green tinge which it gives to the alcoholic flame; stearic acid by its insolubility in dilute acids; sugar by its solubility in cold water; salicine by addition of oil of vitriol, which turns it red; and the sulphate of cinchonia by precipitating the suspected specimens by liquor ammoniæ, and then adding ether, when the Q. will be dissolved, but the cinchonia will float between the two liquids. (This test for cinchonia is recommended by the French govt., which refuses to allow the sale of sulphate of Q. containing more than three per cent. of cinchonia.) The most important use of sulphate of Q. is in treatment of intermittent fever, for which it is a specific. Various nervous affections, especially if they assume a periodical character, are successfully treated by it—e.g., neuralgia, chorea, certain forms of headache, etc. In numerous forms of dyspepsia, debility, and cachexia, there is no single remedy more effectual than the citrate of iron and quinine. The ordinary dose of the sulphate is one to three grains, but in ague it may be given in far larger doses. Desvignes advocated administering solutions of Q. by subcutaneous injection. The solution that he employed was a grain and a half in 15 drops of water, acidulated with a drop of dilute nitric acid. With this he successfully treated several hundred cases of intermittent fever in the district of Tuscany known as the 'Maremma,' in many of which Q. and arsenic administered in the ordinary way had failed to effect a cure. The sulphate may be prescribed in the form of pills made with conserve of roses, or as mixture, in which case a little sulphuric acid should be added to render it soluble. In large doses, as from 10 to 20 grains or more, it excites the nervous system, giving rise to headache, buzzing of the ears, blindness, giddiness—a group of symptoms collectively known as *Quininism;* and several deaths are recorded as arising from its administration in excessive doses. The average dose of the citrate of iron and Q. is 5 grains, which may be given in a glass of sherry. *Quinoidine* (termed also *Amorphous Quinine*) seems as efficient a tonic as sulphate of Q., but not to have so great an anti-periodic power, hence not so serviceable in intermittent fever, etc. *Quinidine* has the medicinal properties of quinine. Pereira and other

physicians have found its sulphate equally serviceable with that of Q., both as tonic and as febrifuge; and the action of *Quinicine* is similar to that of quinoidine. *Cinchonia* appears to act precisely the same as Q., while *Cinchonidine* and *Cinchonicine* are of little therapeutic value.

Q. is employed not only in cure of disease, but also for preservation of health, when the system is exposed to certain noxious influences. Its value as a preventive of intermittent fever is so generally recognized, that the Brit. admiralty regulations require every man to take Q. when the ship is within a certain distance of the e. or w. coast of Africa, and that it should be regularly continued in eight-grain doses every morning to those engaged in boat-cruising along the coasts or on the rivers or creeks. Formerly it was considered certain death to sleep out for one night on James's Island, opposite Charleston, S. C., during the malaria season; in the great war, thousands of men—many protected by use of Q.—were quartered on it. In 1863, when the taking of Q. was optional, there was much fever; in 1864, all were compelled to take their dose regularly every morning, and they were very healthy. It has been said that British rule in India is founded on quinine. Stanley and other African travellers have perpetual recourse to quinia. Various combinations of Q. with strychnia, phosphorus, and other substances, as well as with iron, are in use; and for merely tonic effect, preparations made directly from the bark may be used with advantage. As a key to its action, it is to be observed that Q. is capable of arresting various kinds of putrefaction and fermentation, of killing microscopic organisms, and of arresting the amœboid movements of the white blood-corpuscles.

QUINISEXT, *kwĭn'ĭ-sĕkst* [Lat. *quinque*, five; *sex*, six]: in church history, name given to a council which, being regarded as a sort of supplement of the fifth and sixth general councils, is called by a title which appears to combine both. In the same view, it is called by the Greeks *penthekte* [from *pente*, five, and *hecte*, sixth]. The fifth general council, 553, on the subject of the Three Chapters (q.v.), enacted no canons of discipline. In like manner, the sixth, against the Monothelites, 660, was confined almost entirely to doctrinal decisions. To supply the lack, a numerous body of bishops, 211 in number, assembled 692 in a hall of the imperial palace at Constantinople called the Trullus. It was a purely oriental council, and not only was not approved by the Western Church and the pope, but was almost immediately reprobated. Its decrees are purely disciplinary; and it is important chiefly as the council in which was laid down the broad distinction between the legislation of the East and that of the West on the subject of clerical celibacy. The Q. council, while prohibiting the marriage of any one who is in priest's orders, permits a married man to

receive after marriage the order of subdeacon, deacon, or priest, but not of bishop. Against this, the Roman pontiffs vigorously protested. Another peculiar canon of this synod (67th) prohibits fasting on Saturday, even in Lent. On these and other points of difference in discipline, no agreement between the two churches has yet been reached.

QUINK, n. *kwingk* [see QUIRK]: in *building*, a piece of ground for a court or yard taken out of any regular ground plot or floor.

QUINOA, n. *kwēn-ō-a* [native name]. (*Chenopodium Quinoa*): annual plant, native of Chili and the high tableland of Mexico. It much resembles some of the British species of *Chenopodium* (q.v.); has an erect stem, with ovate, angulate-toothed leaves, the younger ones pulverulent, and panicles much crowded and branched. In the countries in which it is indigenous, it is cultivated for its seeds, which form the principal food of the inhabitants. The meal made from some varieties of the seed has a somewhat peculiar flavor, but is very nutritious. Q. meal resembles oatmeal in not becoming elastic and tenacious when mixed with water, and like oatmeal, can be made only into cakes, not into leavened bread. The plant is sometimes cultivated in gardens for its leaves, a substitute for spinach.

QUINOIDINE, n. *kwīn-oyd'in* [Sp. *quina*, the Peruvian bark; Gr. *eidos*, resemblance]: a resinous substance obtained from the mother liquors of the quinine manufacturers, remaining after all the crystals of quinine that can be separated are obtained; called also *amorphous quinine*.

QUIN'OLINE: see LEUCOL.

QUINQUAGESIMA, a. *kwĭn'kwā-jĕs'ĭ-mā* [L. *quinquagesĭmus*, the fiftieth]: fiftieth; applied to the seventh Sunday before Easter—the Sunday immediately preceding Ash-Wednesday.

QUINQUANGULAR, a. *kwĭn-kwăng'gū-lĕr* [L. *quinquĕ*, five; *an'gulus*, an angle]: having five angles or corners.

QUINQUARTICULAN, n. *kwĭn-kwär-tĭk'ū-lan*: in *chh. hist.*, one of those Arminians, in the 17th c., who agreed with the Reformed Church in all doctrines except the Five Points of Calvinism.

QUINQUARTICULAR CON'TROVERSY: in *chh. hist.*, a controversy which arose in Cambridge, England, 1594, between Arminians and Calvinists regarding the Five Points. In 1626 two conferences were held with a view to settle the dispute. It was revived at Oxford and in Ireland 1631.

QUINQUE, *kwĭn'kwĕ*, contr. QUINQU [L. *quinquĕ*, five]: a prefix in many compound words, signifying 'five.'

QUINQUECAPSULAR, a. *kwĭn'kwĕ-kăp'sū-lĕr* [L. *quinquĕ*, five; *cap'sŭla*, a little chest]: in *bot.*, having five capsules.

QUINQUECOSTATE, a. *kwĭn'kwĕ-kŏs'tāt* [L. *quinquĕ*, five; *costa*, a rib]: in *bot.*, five-ribbed.

QUINQUEDENTATE, a. *kwĭn'kwĕ-dĕn'tāt* [L. *quinquĕ*, five; *dentātŭs*, toothed—from *dens* or *dentem*, a tooth]: in *bot.* or *zool.*, five-toothed.

QUINQUEFARIOUS, a. *kwĭn'kwĕ-fā'rĭ-ŭs* [new L. *quinquefārĭŭs*—from L. *quinquĕ*, five]: in *bot.*, applied to leaves disposed in five rows along the stem; opening into five parts.

QUINQUEFID, a. *kwĭn'kwĕ-fĭd* [L. *quinquĕ*, five; *fidi*, I have split; *findo*, I split]: in *bot.*, five-cleft; cut into five parts as far as the middle.

QUINQUEFOLIATE, a. *kwĭn'kwĕ-fō'lĭ-āt* [L. *quinquĕ*, five; *folĭum*, a leaf]: in *bot.*, having five leaves.

QUINQUELITERAL, a. *kwĭn'kwĕ-lĭt'ĕr-ăl* [L. *quinquĕ*, five; *lĭtĕrā*, a letter]: having five letters.

QUINQUELOBATE, a. *kwĭn'kwĕ-lō'bāt*, or QUIN'QUELOBED, a. *-lōbd* [*quinquĕ*, five; Gr. *lobos*, the lobe or lower part of the ear]: in *bot.*, five-lobed; divided nearly to the middle into five distinct parts, with convex margins.

QUINQUELOCULAR, a. *kwĭn'kwĕ-lŏk'ū-lĕr* [L. *quinquĕ*, five; *locŭlus*, a little place or cell; *locus*, a place]: in *bot.*, having five cells, as a pericarp.

QUINQUENNIAL, a. *kwĭn-kwĕn'nĭ-ăl* [L. *quinquĕ*, five; *annus*, a year]: happening every five years, or lasting five years.

QUINQUEPARTITE, a. *kwĭn'kwĕ-pâr'tīt* [L. *quinquĕ*, five; *partītus*, divided—from *pars* or *partem*, a part]: in *bot.*, divided deeply into five parts.

QUINQUEREME, n. *kwĭn'kwĕ-rēm* [L. *quinquĕ*, five; *rēmus*, an oar]: in *anc. Rome*, a galley with five banks of oars. These vessels, however arranged (see TRIREME), may be regared as the first-rates of the ancient navies. The Greek states used them after the death of Alexander, and the Carthaginians a little later. A Carthaginian vessel of this class served during the first Punic war as a model to the Romans, who built 100 on the coast of Bruttii B.C. 266, and thenceforward maintained fleets of such ships. According to Polybius, a Q. carried 300 seamen and 120 soldiers.

QUINQUEVALVE, a. *kwĭn'kwĕ-vălv*, or QUIN'QUEVALV'ULAR, a. *-vălv'ū-lĕr* [L. *quinquĕ*, five; *valvæ*, the folds of a door]: in *bot.*, having five valves.

QUINQUINA, *kwĭn-kwī'nà* [Sp. *quina quina*, Peruvian bark]: a name for the cinchona or Peruvian bark.

QUINSY, n. *kwĭn'zĭ* [corrupted from OF. *squinancie*; F. *esquinancie*; It. *squinanzia*, quinsy—from Gr. *kunang'chē*, *lit.*, a dog-throttling—from *kuōn* or *kuna*, a dog; *angchein*, to throttle]: common inflammatory sore throat: known also as CYNANCHE TONSILLARIS and TONSILLITIS; inflammatory affection of the substance

of the Tonsils (see PALATE). The inflammation is seldom limited to these glands, but extends to the uvula, the soft palate, the pharynx, and frequently the salivary glands. The disease manifests itself usually by difficulty in swallowing, and a sense of heat and discomfort in the throat, often amounting to considerable pain. On examination, the throat at first exhibits unnatural redness with enlargement of one or both tonsils. The uvula is enlarged and elongated; its end either dropping down into the pharynx, and by exciting the sensation of a foreign body, giving rise to much irritation, or else adhering to one of the tonsils. The tongue is usually furred, and the pulse rapid, and there are the ordinary symptoms of that form of constitutional disturbance known as inflammatory fever. The inflammation terminates either in resolution (if the attack is not severe, and yields readily to treatment) or in suppuration, which may be detected by the occurrence of slight rigors, and by increased softness of the enlarged tonsil. The matter discharged has a fetid smell, and the fetor is often the first indication of the rupture. The pain almost entirely ceases with the discharge of matter, and recovery is then rapid. The disease is usually at its height in about a week after the manifestation of the first symptoms, and it almost invariably terminates favorably. The ordinary exciting cause of this disease is exposure to cold, especially when the body is warm and perspiring; and certain persons (or families) are so subject to it that slight exposure is almost sure to induce it.

The disease may sometimes be cut short if, at its very commencement, a sharp purgative (e.g., compound infusion of senna with Epsom salts) be administered, followed almost immediately by an emetic of a scruple of ipecacuanha with a grain of tartar emetic. The patient should remain in the house (in cold weather, in bed), and should be kept on low non-stimulating diet. A stimulating liniment, such as the compound camphor liniment, should be applied to the outside of the throat, and the neck should be surrounded with a piece of flannel. In mild cases, this treatment is sufficient. In more severe cases, the patient may gargle frequently with hot water, or milk and water, or, which is better, may inhale the vapor of boiling water. Blistering and leeching will sometimes give relief, but if suppuration has been established, they do harm rather than good. If the tonsils are very much enlarged, they should be pricked with a lancet made expressly for the purpose.

Dr. Trench, in his *English Past and Present*, gives quinsy (or quinsey, as he spells it) as an example of the gradual recasting of a foreign word into a new English mold. The Greek word *cynanchē* was the origin of the French *esquinancie*, which entered the English language as *squinancy*, became *squinzy* in the time of Jeremy Taylor, and has now softened down to *quinsy* or *quinsey*.

QUINT, n. *kwint* [F. *quinte*, a fifth—from L. *quintus*, the fifth]: a set or sequence of five in piquet.

QUINT, *kwĭnt*, ALONZO HALL, D.D.: Congl. minister, and author: b. Barnstead, N. H. 1828, Mar. 22. He graduated at Dartmouth 1846, Andover Theol. Seminary 1852; was pastor of a Congl. chh. at Jamaica Plain, Mass., 1853–63; chaplain of the 2nd Mass. infantry in the civil war 1861–64; pastor at New Bedford, Mass., 1864–75; and, after some years of invalidism, was acting pastor at Allston, near Boston, 1886–90. In 1891, he filled a lectureship at Auburn Theol. Seminary (N. Y.). He was sec. of the Mass. Gen. Assoc. of Congl. Churches 1856–81; of 3 national Congl. councils 1871–83; editor of the *Congl. Quarterly* 1859–76; mem. Mass. Board of Education 1855–61, and of the Mass. legislature 1881–83. He published, besides many articles, *The Potomac and the Rapidan*, army notes (1864); *Records of the Second Mass. Infantry* 1861–65 (1867); and the *First Parish of Dover* (1883). He was efficient in administrative duties, an admirable debater, a thorough statistician, an instructive writer; and was prominent in the action of his denomination. He d. 1896, Nov. 4.

Ancient Quintain at Offham, Kent.

QUINTAIN, n. *kwĭn'tān*, or QUINTIN, n. *kwĭn'tĭn* [F. *quintaine*, a quintain: It. *quintana*: comp. Gael. *guin*, to dart, to pierce]: a dummy to be pierced or wounded by players; in *former times*, a post to be tilted at in military exercises, sometimes taking the form of a man turning on a pivot; for mounted soldiers, the upright post was

surmounted by a transverse bar, having a flat board at one end, and the other loaded and balanced by a heavy bag of sand, which knocked the rider off his horse as it turned on its pivot, if he struck the flat-board end unskilfully, or at too low a rate of speed.

QUINTAL, n. *kwin'tal* [F. and Sp. *quintal*; It. *quintale*—from L. *centum*, a hundred]: weight consisting of 100 lbs. In France it corresponded to the Eng. *hundredweight*, being equal to 100 livres (pounds); but on the introduction of the metrical system, the name Q. was used for a weight of 100 kilogrammes (see GRAM). The metrical Q. is thus more than twice as heavy as the old one, being equivalent to 220 lbs. avoirdupois.

QUINTANA, *kin-ta'na*, MANUEL José, called the 'Spanish Tyrtæus': 1772, Apr. 11—1857, Mar. 11; b. Madrid. He studied at Salamanca, and established himself as an advocate in his native city, where his house became a resort of the advanced liberals of the time. Among his earliest productions were his *Odes*, which gave him a place in the first rank of Spanish poets. On the outbreak of the War of Independence, he made good use of his lyric gift to stimulate the patriotism of his countrymen, and otherwise distinguished himself as editor of the *Semanario Patriotico*, and author of the manifestoes of the insurrectionary juntas, and of most of the official statements of the first cortes. Meanwhile, he did not abandon literature properly so called. Besides his Spanish Plutarch (*Vidas de los Españoles Célebres*, Madr. 1807–34), reckoned one of the finest Spanish classics, he published one or two tragedies, and an excellent selection of Castilian poetry (*Poesías Selectas Castellanas*, 3 vols. Madr. 1808). On the restoration of Ferdinand VII. 1814, Q.'s liberalism caused his imprisonment for six years. At his release 1820, he was received in Madrid with acclamations, and appointed pres. of public instruction. His enthusiasm in the cause of liberty seems now to have somewhat abated. In 1835 he was reappointed director-gen. of public instruction, which office he held till 1851. He was also made a peer and a senator, and acted as tutor to the young queen Isabella 1840–43. 1855, Mar. 25, Q. was honored with a public ovation in Madrid, had a speech made to him by the cortes, and a crown of golden laurel placed on his brows by the hand of Isabella herself. Q.'s works are collected in *Biblioteca de Autores Españoles* of Rivadeneyra (Madr. 1852).— See Kennedy's *Modern Poets of Spain*, and Ticknor's *History of Spanish Literature*.

QUINTARD, *kwin-tärd'*, CHARLES TODD, M.D., S.T.D., LL.D.: Prot. Episc. bishop: born Stamford, Conn., 1824, Dec. 22. He studied medicine at the Univ. of New York, graduated from that institution 1846; became a prof. in the medical college at Memphis, Tenn., and one of the editors of the *Medical Recorder* 1851; was ordained deacon in the Prot. Episc. Church 1855, and was afterward rector of a church in Nashville. He

served as chaplain in the Confederate army; was elected bp. of Tennessee, to which office he was consecrated 1865, Oct. 11, and which he still holds (1895). He has published Addresses, Tracts, Letters, and Occasional Sermons.

QUINTERNA, n. *kwĭn-tĕr'na* [It.]: a kind of guitar not unlike a violin in shape, having three, or four, or five pairs of catgut strings, and sometimes two single strings covered with wire in addition, played with the fingers.

QUINTESSENCE, n. *kwĭn-tĕs'sĕns* [F. *quintessence;* It. *quintessenza*, quintessence—from L. *quinta essen'tiă*, the fifth essence]: the pure essential part of anything; force, virtue, or spirit of a thing; according to the *alchemists*, the highest essence of power in a natural body (see ALCHEMY). The word is of ancient origin, and dates from the time when it was generally believed that the simple elements or constituents of bodies were *four* in number, viz., fire, air, earth, and water; and that earth was the lowest element, being grosser than water, water than air, and air than fire. Some Pythagorean philosophers, not satisfied that these four elements or essences sufficed for the composition of all substances in nature, added to them a fifth element or essence, *ether*, which was supposed to be more subtle and pure than fire (the highest of the four), and was therefore located in the uppermost regions of the sky. The word 'quintessence' has thus come down to us in the signification of the most subtle ingredient or extract of any body; though in ordinary language it is employed in a figurative sense, as noted above.—Q. now denotes also a preparation of a vegetable essential oil dissolved in spirits of wine: see PERFUMERY. QUIN'TESSEN'TIAL, a. *-sĕn'shăl*, consisting of quintessence.

QUINTET, or QUINTETTE, n. *kwĭn-tĕt'*, or QUINTET'TO, n. *-tō* [F. *quintette;* It. *quintetto*—from *quinto*, the fifth: L. *quintus*, the fifth]: in *music*, a composition for five voices or five instruments, each of which is *obligato:* also the performers of such a composition. The most remarkable quintets for stringed instruments are those of Boccherini, Mozart, Beethoven, and Onslow; and for wind instruments (flute, oboe, clarionet, horn, and bassoon), those of Reicha.

QUINTILE, n. *kwĭn'tĭl* [F. *quintil*, quintile—from L. *quintus*, fifth]: the position of two planets when distant from each other 72 degrees, or the fifth part of a circle.

QUINTILIAN, *kwĭn-tĭl'i-an* (M. FABIUS QUINTILIANUS): born not later than A.D. 35, in the town of Calagurris (modern Calahorra) on the Ebro, Spain; d. prob. not long before A.D. 96. He attended in Rome the prelections of Domitius Afer, who died 59. Afterward he revisited Spain, whence he returned 68 to Rome, in the train of Galba, and began to practice as an advocate, gaining some reputation. He was more distinguished, however, as teacher than as practitioner of the oratorical art, and his instructions came to be the most eagerly

sought after among all his contemporaries, while among his pupils he numbered Pliny the Younger and the two grand-nephews of Domitian. As a mark of the emperor's favor he was invested with the insignia and title of consul; Q. was the first public teacher who benefited by the endowment of Vespasian, and received a fixed salary from the imperial exchequer. His professional career as teacher of eloquence, beginning probably A.D. 69, extended over a period of 20 years, after which he retired into private life. The reputation of Q. in modern times is based on his great work *De Institutione Oratoria Libri XII.*, a complete system of rhetoric, which he dedicates to his friend Marcellus Victorius, himself a court favorite and orator of distinction. It was written (as he tells us in his preface to his bookseller Trypho) after he had ceased to be a public teacher; and was the fruit of two years' labor. During its composition, however, he was still acting, in the lifetime of Domitian, as tutor to the grand-nephews of that emperor. In the 1st book, he discusses the preliminary training through which a youth must pass before he can begin those studies requisite for the orator; and he gives an elaborate outline of the mode in which children should be educated in the interval between the nursery and the final instructions of the grammarian. The 2d book treats of the first principles of rhetoric, and contains an inquiry into the essential nature of the art. The subjects of the five following books are invention and arrangement; those of the 8th, 9th, 10th, and 11th are composition (embracing the proper use of figures of speech) and delivery. The last, and, in the author's view, most important, book treats of the various requisites for the formation of a finished orator, such as his manners, his moral character, his mode of undertaking, preparing, and conducting causes, the style of eloquence most advantageous to adopt, the age at which pleading should be begun, and at which it should be left off, and other allied topics. The entire work is remarkable for its sound critical judgments, its purity of taste, and the perfect familiarity which it shows with the literature of oratory. The condensed survey of Greek and Roman literature with which the tenth book commences, has always been admired for its correctness and animation. It has been said of him that 'the gentle justness of his sentiments is accompanied by a curious felicity of phrase.' His whole style reveals literary culture, artistic taste, wholesome ethics, and a most winning and lofty personality. —The declamations, amounting to 164, which have been ascribed to him, are now deemed spurious, as they evidently belong to different authors, and even different epochs. There is better ground, however, for ascribing to him the anonymous *Dialogus de Oratoribus*, often included in editions of Tacitus. The best editions of Q. are those of Burmann (1720); Spalding and Zumpt (1798–1829); Bonnell (1872–74); and Halm (1868–9)

QUINTILIAN, n. *kwĭn-tĭl'i-an :* in *chh. hist.*, one of the followers of Quintilia, of Carthage, a Montanist lady in the 2nd c., reputed to be a prophetess. They used bread and cheese in the Eucharist, and allowed women to become priests and bishops. Tertullian wrote against them.

QUINTILLION, n. *kwĭn-tĭl'yŭn* [L. *quintus*, fifth, and Eng., *million*] : in *Eng. notation*, a number produced by raising a million to the fifth power, or a unit followed by 30 ciphers : in the *F.* and *It. notations*, a unit followed by 18 ciphers.

QUIN'TIN : see QUINTAIN.

QUINTIN' MATSYS' (or MASSYS') : famous painter of the early Flemish school : see MATSYS, QUINTIN.

QUINTROON, n. *kwĭnt-rôn'* or *kwĭn'tĕr-ōn* [Sp. *quinteron*—from L. *quintus*, fifth] : in the W. Indies, a person who has one thirty-second part of negro blood.

QUINTUPLE, a. *kwĭn'tū-pl* [F. *quintuple*—from L. *quin'tuplex*, five-fold—from *quintus*, fifth ; *plico*, I fold : It. *quintuplo*] : fivefold ; in *music*, having five notes of equal value in a bar—now rarely used : V. to multiply by five : to make fivefold. QUIN'TUPLING, imp. *-pling.* QUIN'TUPLED, pp. *-pld.* QUIN'TUPLET, any set or group of five ; five children born at a birth : in *music*, rhythmical group of five notes, formed of a note divided into five instead of its proper complement of four parts ; the five notes having collectively the value usually expressed by four such notes. Thus the five semiquavers of the group are equivalent in value to one crochet, or four ordinary semiquavers.

QUINTUS CURTIUS RUFUS, *kwĭn'tŭs kĕr'shĭ-ŭs rō'fŭs :* Roman historian : probably of the time of Vespasian (A. D. 10–79) ; a less plausible conjecture assigns him to the period of Constantine (A.D. 272–337). Nothing further is known, or can be fairly surmised regarding his life. His work *De Rebus Gestis Alexandri Magni Regis Macedonum* consisted of ten books ; but of these the first two are lost, and the other eight are occasionally imperfect. Its style is flowing and ornate, but it lacks the pure Latinity of Cicero, and the simplicity of Cæsar. With the Greek history of Arrian, it forms our most valuable source of information respecting the military career of Alexander the Great, though it is not entirely free from geographical, chronological, and strategical blunders. The best ed. is that of Zumpt (Brunswick 1849).

QUINZAINE, n. *kwĭn'zān* [F. *quinzaine*, a fortnight—from *quinze*, fifteen—from L. *quindĕcim*, fifteen] : the 14th day after a feast-day, or the 15th if the feast-day be included.

QUINZE, n. *kĭnz* [F. fifteen]: a game at cards, usually played by two persons, in which the game is fifteen or nearest it.

QUIP, n. *kwĭp* [W. *chwip*, a quick turn or flirt; *chwipio*, to whip: Icel. *kvapp*, a leaping or moving swiftly: Gael. *cuip*, a whip, a trick]: a cut; a smart stroke, as with a whip; a gibe; a sarcasm; a jeer; a flout; a cavil: V. to taunt; to scoff. QUIP'PING, imp. QUIPPED, pp. *kwĭpt*. QUIPS AND CRANKS, jests and conceits.

QUIPPA, n. *kwĭp'pă* [Peruvian. *quipu*, a knot]: in *anc. Mexico* and *Peru*, a knotted cord of variously colored threads, from which hung smaller threads, in the manner of a fringe, used to record events; also spelt QUIPO, *kē'pō*, and QUIPU, *kē'pō*.

QUIRE, n. *kwīr* [OF. *quaier*; F. *cahier*, a quire of written paper: Gael. *coir*, a charter or parchment written on: Sp. *quaderno*, four sheets of paper stitched together: It *quaderno*, a quire of paper: Dut. *quatern*, a few sheets stitched together: L. *quaterni*, four at a time]: a quantity of twenty-four sheets of paper, each folded once.

QUIRE, n. *kwīr* [F. *chœur*; L. *chorus*, a band of singers]: another spelling of CHOIR, which see. QUIRISTER, n. *kwīr'ĭs-tẽr*, for CHORISTER.

QUIRINAL, a. *kwī-rī'năl* [L. *Quirīnus*, a name of *Rom'ulus*, the founder of Rome—from *quiris*, a lance or spear]: of or belonging to Quirinus or Romulus: N. the royal palace at Rome (see QUIRINUS).

QUIRINALIA, n. *kwĭr-ĭ-nā'lĭ-a* [L.]: in *Rom. antiq.*, annual feasts at Rome in honor of Romulus, who was called also Quirinus.

QUIRINUS, *kwī-rī'nŭs*: among the Sabines (and according to Mommsen, among the Latins also), a surname of Mars, equivalent to the 'Spear-bearer.' According to the anc. legend, the name was first given to Romulus (q.v.), as the son of Mars, after his apotheosis, and the festival instituted in his honor was called the *Quirinalia*.—The QUIRINAL (Lat. *Collis Quirinalis*), is one of the seven hills on which anc. Rome stood; and, next to the Palatine and Capitoline, the oldest and most famous quarter of the city. It is due n. of the Palatine, and its w. slope looks down on the Campus Martius, which stretches from its base to the banks of the Tiber. According to the anc. legend, it was the seat of the Sabine portion of the mixed population of early Rome; but this idea is strongly combated by Mommsen, who rejects as a 'baseless speculation' the 'etymologico-historical hypothesis started by Varro—and as usual, unanimously echoed by Latin writers—that the Latin *quiris* and *Quirinus* are akin to the Sabine town *Cures*, and that the Quirinal Hill accordingly had been peopled from Cures' (*History of Rome*, I.). The most notable structures on the Quirinal were *The Temple of Quirinus*, said to have been built by Numa in honor of Romulus, *The Temples*

of Flora, Salus, Fortuna, and Sol. Here, also, were the famous Gardens of Sallust (*Horti Sallustiani*), the *Circus Flora*, the *Circus Sallustii*, the Baths of Diocletian, and the Prætorian Camp.

QUIRINUS-OIL, n. *kwī-rī′nŭs-oyl:* in *chem.*, a kind of rock oil of thickish consistence, so called from the chapel of St. Quirinus at Tgernsee, near which it issues. It is brownish-yellow, olive-green by reflected light; sp. gr. 0·835.

QUIRITES, *kwī-rī′tēz* [L., from *Curetes*, inhabitants of a Sabine town *Cures*]: in the early Roman history, term for those Romans who as both warriors and citizens were entitled to vote in the assembly of those who carried arms. This old name of the Sabine tribe, after the union of the Sabines and Romans, was used interchangeably for, or together with, the name Romans as denoting the full Roman citizenship. For a while the name was considered honorable, and to a late period it was a title of respect when applied to citizens and when used in public meetings; but in the army it became a title of dishonor, and indicated that those to whom it was applied were deficient in soldierly qualities and should not be allowed to enter the ranks of the armed men.

QUIRK, n. *kwėrk* [prov. Eng. *quirk*, to turn: AS. *thwir*, perverse, crooked: Ger. *zwerch*, athwart: comp. W. *chwiori*, to turn rapidly]: a shift; a cavil; a subterfuge: an artful turn for evasion; a quibble; a smart taunt or retort; a slight conceit: in *arch.*, a small acute channel or recess between moldings: in *building*, a piece of ground cut off from any regular ground-plot: see QUINK. QUIRKED, a. *kwėrkt*, having a quirk. QUIRK′ISH, a. *-ish*, consisting of or resembling a quirk.

Quirk.

QUISCALUS, *kwis′ka-lŭs:* genus of birds of family *Sturnidæ*, having the tail longer than in the starlings (*Sturnus*), and *graduated*—the middle feathers longest—its sides turned up. From this last character, some of the species are often called BOAT-TAIL. The Great Boat-tail, or Great Crow Blackbird (*Q. major*), a bird about 16 or 17 inches long, is common in s. parts of N. America.—More common, and indeed abundant in all parts of the United States, is the PURPLE GRACKLE, or CROW BLACKBIRD (*Q. versicolor*), a bird about 12 inches in length, tail included; black, reflections of blue, violet, etc. Vast flocks of this species are to be seen at the seasons of migration in parts of N. America. Its migrations extend to far n. regions in summer: it is found in La. at all seasons. Its depredations in fields of maize and other kinds of grain make it an object of especial dislike to farmers. Its flesh is dry and coarse, though often used for food; but its eggs are esteemed a delicacy. Other N. American species are the Thrush Blackbird or Rusty Grackle of the north; the Blue-headed

Grackle of the west; the Fan-tailed or Texas; the Boat-tailed or Jackdaw of the south; the Florida or Green Grackle; and the Bronzed or Brass Grackle of the Gulfo and Rocky Mts. to the far north.

QUIT, v. *kwit* [L. *quiētus*, enjoying rest—in mid. L. used in the sense of 'free from the claim of another party': It. *quito*, a discharge from legal claims: Sp. *quito*, quit: F. *quitter*, to hold quit, to yield, to leave—from mid. L. *quietāre*, to repose, to absolve from debt]: to leave; to depart; to discharge an obligation; to absolve; to acquit; to conduct; to abandon; to forsake; to resign; to give up: ADJ. free; clear; discharged from. QUIT'TING, imp. QUITTED, pp. *kwit'ĕd*, or QUIT, pp. QUIT'TER, n. *-ĕr*, one who quits. QUIT-RENT, in *law*, small rent paid by tenants of some old manors in England to a superior in token of submission, or for release from other claims—in old records called *white-rent* because paid in silver money as distinguished from grain rents. QUIT'TAL, n. [for *acquittal*]: in *OE.*, return; repayment. QUITTANCE, n. *kwit'ans* [F.—L.]: discharge from a debt or obligation; in *OE.*, recompense; repayment: V. in *OE.*, to repay; to recompense. QUITS, a. int. *kwits*, denoting that parties are quit, or put on equal terms.—SYN. of 'quit, v.': to resign; surrender; discharge; requite; repay; leave; forsake; relinquish; absolve; acquit.

QUI TAM, *kwī tăm* [L. who as well]: in *law*, a penal action, named from the first words of the old common-law writ, the plaintiff describing himself as suing for the people or the state as well as for himself, between which parties the penalty is divided.

QUITCH, or QUITCH-GRASS, n. *kwich-* [see COUCH GRASS, and QUICK-GRASS under QUICK]: properly, quick-grass; dog-grass or Couch Grass (q.v.).

QUITCLAIM, *kwit'klām*, in Law: deed or conveyance partaking of the nature of both a grant and a release (see RELEASE). In the United States the Q. is equivalent to the release in England. It presupposes an existing estate claimed by the grantor, or one previously conveyed without a Q. clause. In some states it is considered an original conveyance. The party giving the Q. merely transfers the rights and interests which he assumes to possess in the property described, but takes no responsibility as to insuring the validity of the title which he passes. The effective words of the instrument are 'remise, release, and forever quitclaim.'

QUITE, ad. *kwīt* [from QUIT, which see: F. *quitte*, discharged, clear]: wholly; entirely; perfectly; to a great extent or degree; very.

QUITMAN, *kwit'man*, JOHN ANTHONY, LL.D.: soldier: 1799, Sep. 1—1858, July 17; b. Rhinebeck, N. Y. He studied law in O.; removed to Natchez, Miss., 1821, where he practiced with great success. He became a member of the state legislature 1825, was chancellor of the state 1828-34, aided in drafting the new state constitution 1832, and was pres. of the state senate and acting-gov. 1835. He led a party of soldiers to aid the Texans 1836; ten years later was appointed brig.gen., served with great credit in the Mexican war, was brevetted maj.gen., and appointed gov. of the city of Mexico. He was again gov. of Miss., was member of congress for two terms from 1854, and chairman of the military committee both terms. He was a strong advocate of the doctrine of state rights, and favored the secession of the southern states. He died at Natchez. His *Life and Correspondence*, by J. F. H. Claiborne, was published 1860.

QUITO, *kē'tō*: city, cap. of Ecuador (q.v.), and of the province of Pichincha, stands between two parallel ranges of the Andes, on the e. side of the volcano of Pichincha (q.v.), 9,492 ft. above sea-level; lat. 0° 15′ s., long. 78° 45′ w. Its site, in the midst of mountains, is very uneven; its appearance is picturesque, and its beautiful environment of mountains, with its clear, healthful, and temperate climate, averaging 60° Fahr., and described as an eternal spring, make it one of the most charming cities of S. America. From the hills in the vicinity, a beautiful panoramic view embraces eight icy peaks of the Andes; and s. of the city extends the lovely valley of Chillo, laid out in gardens. The chief edifices are of stone, the others of adobes, or sun-dried bricks, covered with tiles. Q. contains many churches, monasteries, convents, two hospitals, two colleges, and several plazas or squares. By the earthquake of 1859, Mar., most of the churches, convents, and govt. buildings as well as many private residences, were thrown down, property to the value of $3,000,000 was destroyed, and many lives were lost. From this calamity, the city has in great part recovered. Q. is the seat of the only abp. in the country; it is also the seat of govt. Coarse cotton and woolen goods and jewellery are manufactured, and the trade in grain, indigo, metals, and liquors is extensive.—For the most important events in the history of Q., see ECUADOR: PERU.—Pop. (1885) 50,000.

QUITTANCE: see under QUIT.

QUITTER, or QUITTOR, *kwĭt'ẽr:* fistulous wound about the top of the horse's foot, resulting from treads, pricks, or neglected corns, which lead to formation of matter underneath the hoof. Any dead horn, matter, or other cause of irritation must be sought for by cutting away the hoof. A free opening must be provided for egress of any pent-up matter. Poulticing for a few days is often useful; and healing may afterward be expedited by injection of any mild astringent lotion. The powerful caustics frequently used cause much unnecessary pain, and often aggravate the evil. QUITTER-BONE, or QUITTOR-BONE, a hard round swelling on the coronet of a horse.

QUIVER, n. *kwĭv'ẽr* [OF. *quivre;* AS. *cocer;* Ger. *köcher;* Dan. *koger;* Dut. *koker*, a case]: a case for arrows, slung at the back of the warrior, or hung to his belt: V. to supply with a quiver. QUIV'ERED, a. *-ẽrd*, sheathed as in a quiver; furnished with a quiver.

QUIVER, v. *kwĭv'ẽr* [related to Eng. *quaver:* L. *vibrārĕ*, to set in tremulous motion: Sp. *quebrar*, to break: Dut. *kuyveren*, to shiver, to tremble]: to tremble or shake; to quake; to shiver; to be agitated with a tremulous motion, as leaves: ADJ. in *OE.*, nimble; active. QUIV'ERING, imp.: ADJ. fluttering; tremulous: N. a fluttering, tremulous motion. QUIV'ERED, pp. *-ẽrd.* QUIV'ERINGLY, ad. *-lĭ.*

QUI VIVE? *kē vēv'* [F. *qui vive?* who is there? *qui*, who; *vive*, to live]: the challenge of a French sentinel, 'who goes there?' 'to what party do you belong?' To BE ON THE QUI VIVE, to be on the alert, like a sentinel.

QUIXOTIC, *kwĭks-ŏt'ĭk:* like the hero Don *Quixote*, of the famous Spanish romance by Cervantes of the same name, who had high-flown and absurd notions of chivalry; romantic or chivalrous to absurdity. QUIXOTISM, n. *kwĭks'ŏt-ĭzm*, and QUIX'OTRY, n. *-rĭ*, romantic and absurd notions; visionary schemes.

QUIZ, n. *kwĭz* [said to have originated in a joke perpetrated by one Daly, a Dublin theatre-manager, who posted all over the town bills which were covered with the meaningless letters *q u i z*]: something to puzzle; an odd fellow; one addicted to mockery and jesting in simulated gravity: V. to banter; to examine narrowly with an air of mockery; to peer at. QUIZ'ZING, imp. *-ĭng:* N. the act of mocking by pretended seriousness of conversation, or by seeming serious flattery: ADJ. fitted for quizzing. QUIZZED, pp. *kwĭzd.* QUIZZING-GLASS, a small eye-glass. QUIZ'ZICAL, a. *-ĭ-kăl*, comical.

QUOAD SACRA, phrase, *kwō'ăd sā'krȧ* [L.]: so far as regards sacred matters: as, a *quoad sacra* parish.

QUOD, n. *kwŏd* [slang]: the *quad*rangle of a prison, within which the prisoners take exercise—hence slang for a prison.

QUODLIBET, n. *kwŏd'lĭ-bĕt* [L. what you please]: a nice point; a subtilty: PLU. questions on general subjects without order or connection. QUOD'LIBET'ICAL, a. *-ĭ-kăl*, not restrained to a particular subject; discussed at pleasure for curiosity or entertainment. QUOD'LIBET'ICALLY, ad. *-lĭ*: see QUILLET.

QUOIF, n. *koyf* [F. *coiffe*, a hood—from mid. L. *cofĕă*, a cap]: a cap or hood. QUOIFFURE, n. *koyf'fûr* [F.]: a head dress: see COIF.

QUOIN, n. *koyn* [F. *coin*, a corner—from L. *cuněus*, a wedge: It. *cuneo;* Sp. *cuña*, a wedge: the same word as COIN]: generally, a wedge or an angle. In *artillery*, the Q. is a wedge inserted beneath the breech of a gun for raising or depressing the muzzle. The Armstrong gun is elevated by a screw instead of a Q.; but considering the rough service of actual warfare, it is doubtful whether the clumsier Q. is not more trustworthy. Quoins on *shipboard* are wedges used to prevent casks from damaging each other. Q. in *printing* is a small wedge used to tighten the pages of type within the case. Q. in *architecture* is one of the stones forming the solid corner of a building. Where the work is of brick or small materials, the quoins are usually of ashlar. They sometimes project, and are molded, when they are called 'Rustic Quoins': see RUSTICATION.

QUOIT, n. *koyt* or *kwoyt* [Scot. *coit*, to butt or jostle: OF. *coiter*, to hasten, incite: prov. Eng. *cot*, to toss, to throw: Fin. *kautta*, a quoit]: heavy flat ring of iron for tossing or throwing at a mark on the ground at play: PLU. the game, played: V. to throw or play at quoits. QUOIT'ING, imp.: N. the act of playing at quoits. QUOIT'ED, pp.—*Quoits* seems to have been derived from the ancient game of 'throwing the *discus*,' a favorite amusement of the Greeks and Romans. The discus was a circular plate of stone or metal, 10-12 inches in diameter, and was held by its further edge with the right hand, so as to lean upon the fore-arm, and was cast with a swing of the arm, aided by a twist of the whole body. It was generally thrown edge foremost, and upward at an angle of 45°, so as to give it as great a range as possible, and the player who threw it furthest was the winner. Similar to this game was the 'throwing of the *solos*,' a heavy spherical mass of stone or iron, perforated through the centre, to admit a rope or thong, by the aid of which it was thrown. In this game also, the furthest throw was the successful one. It is still practiced by the mountaineers of the Appenzell, in Switzerland. The game of quoits differs from both these. A Q. is a flattish ring of iron, generally 8¼ to 9½ inches in external diameter, and between 1 and 2 inches in thickness. It is convex on the upper side, and slighty concave on the under, so that the outer edge curves downward and is sharp enough to stick into the ground. The mode of playing is as follows: two pins, called 'hobs,' are driven into the ground 18 to 24 yards apart; and the players, divided into two parties, stand at one hob, and in regular succession throw their quoits (of which each player has two) as near to the other hob as they can. The points are counted as in bowls or in curling. To facilitate the sticking of the quoits at the point where they strike the ground, a 'clay end'—that is, a flat circle of clay, about 1 or 2 inches in thickness, and 1½ ft. in radius—is placed round each hob. This requires to be kept moist, and should have sawdust strewed over it. The Q., when to be thrown, is grasped with the right hand by one side, and pitched with an upward and forward jerk of the hand and arm, which give it a whirling motion, and cause it to strike the ground with its edge. Professional players acquire such dexterity in this game that they can very frequently 'ring' their Q.—that is, land it so that the Q. surrounds the hob. A game, very similar to quoits, but played with billets of wood about 2 ft. long and 5 or 6 inches in diameter, furnishes much admirable exercise, and much diversion by its oppor-

Quoit.

Hob.

tunities for knocking away an opponent's billet. The billets, in some places called 'loggerheads,' are cut away at one end so as to be easily grasped and thrown with one hand.

QUONDAM, a. *kwŏn'dăm* [L. *quondam*, formerly]: having been formerly; former, as a *quondam* friend.

QUORUM, n. *kwōr'ŭm* [L. *quorum*, of whom, being the gen. plu. of *qui*, who—from the first word of the commission, beginning '*quorum unum vestrum*,' issued to certain special justices, whose presence, along with the ordinary justices, was legally required to constitute a court]: in any regularly constituted body, that number of individuals who are entitled or bound, by law, or by their own rules, to transact business for the whole body: a special commission of justices.

QUOR'RA: see NIGER.

QUOTA, n. *kwō'tă* [It. *quota*, a share—from L. *quŏtŭs*, which or what in number, order, etc.—from *quot*, how many]: the share, part, or proportion assigned to each.

QUOTE, v. *kwōt* [OF. *quoter;* F. *coter*, to set or put marks, to number—from mid. L. *quotārĕ*, to mark off into numbers and verses: L. *quŏtŭs*, what in number]: to cite or note with chapter and verse; to name, repeat, or adduce, as a passage from some author, by way of authority or illustration; to name, as the price of an article. QUOT'ING, imp. QUOT'ED, pp. QUOT'ER, n. *-ér*, one who quotes. QUOT'ABLE, a. *-ă-bl*, that may be quoted or cited. QUOTATION, n. *kwō-tā'shŭn*, the act of quoting or citing; the words or passage quoted; the price of an article named or given.—SYN. of 'quote': to cite; repeat; name; adduce.

QUOTH, v. *kwōth* [AS. *cwethan;* Goth. *quithan*, to say: Ger. *kosen*, to prattle]: say, says, or said—used only in the 1st and 3d persons, and always followed by its nominative, as, *quoth he.*

QUOTIDIAN, a. *kwō-tid'i-ăn* [L. *quotidiānus*, every day—from *quŏtŭs*, how many; *dĭēs*, a day]: daily; occurring every day, or returning daily: N. anything returning daily; a particular form of ague. QUOTIDIAN FEVER (see AGUE).

QUOTIENT, n. *kwō'shĕnt* [F. *quotient*, quotient—from L. *quotiēs*, how often, how many times]: in *arith.*, the number resulting from the division of one number by another, thus showing *how often* a less number is contained in a greater.

QUOTUM, n. *kwō'tŭm* [L. *quŏtŭs*, how many (see QUOTA)]: part or proportion; share.

QUO WAR'RANTO, in Law: writ or information issued from a court, calling on a person or body of persons to show by what warrant they exercise a public office or privilege. It is the legal mode of remedying any usurpation of privilege or of office.

R

R, or r: 18th letter in the English and other Western alphabets, a consonant, one of the group of liquids: see LETTERS. Its name in Hebrew was Resh, meaning forehead, and the rude outline of a head is thought to be yet recognizable in the Phœnician form of the letter. Of all the consonants, R approaches most nearly to the vowels. In Sanskrit, there is an R-vowel distinguished from the R-consonant by a different character. The Greek also had two varieties of R, one with the 'spiritus asper' (ῥ), or rough breathing, at the beginning of words, and when following another R, and the other with the weaker breathing (ρ) in other positions. The Romans in spelling Greek words represented the R with rough breathing by *rh;* hence we still write *Rhodes, rheumatism, catarrh.* This *rh* was probably of the guttural kind commonly called a 'burr.' This pronunciation of *r* occurs as a peculiarity of individuals everywhere, but it is universal in Northumberland and Durham, England, and characterizes the pronunciation of the letter in certain positions throughout Germany and Scandinavia. The normal pronunciation of R in English and in the Romanic tongues (and it appears to have been the same in Latin), is a vibratory sound produced by applying the tip of the tongue near the roots of the upper fore-teeth. From the resemblance to the growl of an angry dog, R was called by the ancients the dog's letter. In modern English, there is an increasing tendency to smooth down the roughness of the vibration, until, in such words as *far, serf, world,* the *r* has dwindled to a kind of nondescript vowel, modifying the preceding vowel. This emasculating process—for such it undoubtedly is—is so far only the operation of the universal law of phonetic decay, arising from the natural tendency to spend as little energy as possible; but it has been accelerated in this case by a fashion which is apt to mistake languor and indifference for refinement. This affectation goes so far as to turn words like *very, rare,* into *vewy, waaw.* R is one of the most difficult articulations; children are long in learning it, and some individuals never can pronounce it. Whole nations (e.g., the Chinese and some Polynesian tribes) have no such consonant in their language, using *l* instead. For interchanges of *r* with *l*, see L. A more remarkable substitution is that of *r* for *d*, prevalent in early Latin, as we learn from Priscian and from inscriptions: e.g., *arvocatos* for *advocatos.* The Latin of the literary period had returned from this corruption, except in *arbiter* (from an old verb, *adbitĕre,* to go to, to intervene), *arcesso,* and *meridies* (for *medidies,* from *medius*). The substitution is easily ac-

counted for, when we consider that in both sounds the tongue is applied to the same part of the palate; only in the one it is applied firmly; in the other, loosely, so as to vibrate.

A very common phenomenon, especially in Latin, is the sinking or degradation of an original *s* between two vowels into *r*. On inscriptions, we find *Lases, asas, esum,* for what at a later period was written *Lares, aras, eram. Jus, mos,* became in the genitive *juris, moris,* instead of *jusis, mosis.* Even final *s* was sometimes degraded to *r*, as in the double forms, *arbor* = *arbos, honor* = *honos.* Curiously, we know the date when the tendency to change *s* between two vowels into *r* set in; for Cicero remarks that L. Papirius Crassus, consul B.C. 336, was the first that was called Papirius, the ancestral name having been Papisius. The interchange in question occurs to some extent in the Teutonic tongues also: compare Eng. *forlorn* with *lose* (Ger. *verlieren*), *was* with *were;* Ger. *wesen* (to be) with *war* (was), Goth. *hausjan* with Ger. *hören* (to hear); Eng. *hare* with Ger. *hase.* The unstable nature of this articulation is manifested in its frequently changing its place with regard to an adjoining vowel; compare *board* with *broad*; *bird* with old *brid*; *grass* with AS. *gærs.*

RA: see EGYPT.

RAAB, *rab* (Hung. *Győr*): town of Hungary, on an extensive plain at the confluence of the Raab and the Little Danube, a branch of the great river Danube, 67 m.w.n.w of Buda. It consists of an inner and outer town, is regularly built, and mostly well paved, but suffers from insufficient supply of drinking-water. It contains numerous religious edifices, among which is a beautiful cathedral. The manufactures are chiefly tobacco and cutlery; and the trade of the town, favored by its position on the highway between Vienna and Buda, is important both by land and by steamers on the river. Pop. (1890), 23,956.

RAAD, n. *rad* [Dut. *raad*, counsel, advice]: in *s. Africa*, a talking assembly; a parliament.

RAALTE, *ral'teh:* cantonal town of the Netherlands, province of Overyssel, 11 m. n.n.e. of Deventer. Of the people, one-fourth belong to the Reformed Church; the remainder, except a few Jews, to the Rom. Cath. The trade is chiefly in agricultural produce, cattle, wool, wood, and bark for tanning. R. is one of the prettiest places in the province, having many beautiful houses, and in the neighborhood, seats of the nobility. Hans Willem, Baron van Bentinck, founder of the ducal house of Portland, was born at R. 1651. Pop. (1880), 5,795.

RAASAY, *rā'sa:* one of the Western Isles, belonging to the group of the Inner Hebrides, between the Isle of Skye and the mainland of Scotland: 13 m. long by 2½ m. in greatest breadth. The sound of Raasay separates it from Skye, and Applecross Sound from the mainland. On the e. and more sheltered side, are farms, and bold and striking scenery. Brochel Castle, on the e. shore—now a mere ruin—is the chief object of interest in the island. It is perched on the summit of a lofty cliff, which beetles over the sea, and is entirely inaccessible except by a pathway winding around the cliff. Pop. of the island (1881) 473.

RABAT, n. *rā-bat'* a polishing material of potter's clay which has failed in baking.

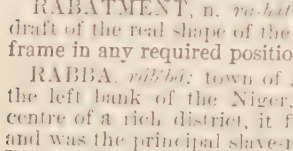
RABAT, or RABATT, *rā-bat':* seaport and manufacturing town in Morocco; at the mouth of the Bu Regreb, on the Atlantic, 135 m. s.s.w. of the entrance to the Strait of Gibraltar. It is surrounded by walls; protected by batteries, and by a citadel, called *El-Mansur;* and contains numerous mosques, minarets, bazaars, etc. Owing to the silting up of the mouth of the river, the commerce of R. has declined. Manufactures of carpets, burnous, woollen fabrics, waterproofs, mixed linen and silk goods, saddlery, etc., are actively carried on. R. was formerly the centre of the European trade with Morocco, and still exports olive oil, wool, grain, oranges, hides, flax, and dye stuffs, wax, etc. There is a small import of cotton-stuffs, linen, cutlery, glass, sugar, and tea. In 1893 it had imports valued at $782,531, and exports, $168,953. Pop. (1895) about 26,000, of whom nearly one-sixth was Jews.

RABATE, v. *rā-bāt'* [F. *rabattre,* to beat down]: in *falconry,* to recover or bring back a hawk from its flight, to the fist. RABAT'ING, imp. RABATED, pp.

RABATMENT, n. *rā-bāt'-ment* [Fr.]: in *ship-build.,* the draft of the real shape of the moulding edges of pieces of the frame in any required position.

RABBA, *rāb'bā:* town of Africa, kingdom of Gando, on the left bank of the Niger, 80 m. above Egga. In the centre of a rich district, it formerly had extensive trade, and was the principal slave-market in this part of Africa. Pop. formerly 40,000; now about 1,000.

RABBET, n. *rāb'bĕt* [F. *raboter,* to plane]: in *carpentry,* a groove cut in the edge of a piece of timber or plank in order that it may lap over, or evenly fit, another like piece; that part of the keel, stern, and stern post of a ship which is cut for the plank of the bottom to fit into: V. to lap over and unite by a rabbet. RAB'BETING, imp.: N. the act or work of preparing rabbets; the process by which a plank is rabbeted. RAB'BETED, pp.



Rabbets.

RABBI, n. *rab'bī* or *-bi*, or RAB'BIN, n. *-bin* [Gr. *rhabbi*; Heb. *rabbi*, my master; *rab*, master, a chief: F. *rabbin*]: a chief; a doctor; a master; sir; honorary title of the Jewish learned men or Masters of the Law. RABBINIC, a *rab-bin'ik*, or RABBIN'ICAL, a. *-i kal*, pertaining to the rabbis, or to their opinions and learning. RABBIN'IC, n the later Hebrew. RABBIN'ICALLY, ad. *-li*. RABBINISM, n. *rab'bin-izm*, an expression or phraseology peculiar to the rabbins; also their doctrines or traditions. RAB'BINIST, n. *-ist*, or RAB'-BINITE, n. *-it*, one who adheres both to the teachings of the Talmud and to the traditions of the rabbins.—*Rabbi* is a title found applied first after the time of Herod, subsequently to the disputes between the two schools of Shammai (q.v.) and Hillel (q.v.). It was a common use at the time of Christ, who was addressed as Rabbi by his disciples and the common people. Other forms of the same title are Rab, Rabban, Rabbon ('Rabbuni')—the first, like R., being more a general term for a certain recognized authority; the latter applying more strictly to a head of an academy. The title Rabban, was given first to the grandson of Hillel, Gamaliel (q.v.), and was borne by only seven other exalted chiefs of schools. Properly speaking, the following dignities alone were of old considered 'official': 1. *Sopher*, scribe, one who occupied himself with copying and commenting on the Scriptures, and who when elected to the Sanhedrim (q.v.), received the title Chacham (Sage); 2. *Rabban*, Nomodidaskalos, one who gave popular orations, homiletically or otherwise treating of the Law. Out of the number of the regular disciples (Talmidim) were chosen the Chaberim (Colleagues), who, again, were elected to the dignity of a R. by the 'Semichah,' or imposition of hands by three members of the Sanhedrim. At present, nothing but the degree of 'Morenu,' our Teacher, bestowed on a candidate who proves his erudition in the written and oral Law and all its bearings before a college of rabbis, is requisite to render him eligible for the post of a R., which, however, carries no authority whatever with it, except on a very few ritual points. We need hardly allude to the popular fallacy of the R. of our day being a kind of 'priest' in the sense of the Old Testament: he is simply a sort of minister of a congregation, the teacher of the young, delivers sermons, assists at marriages and divorces, and the like, and has to decide on some ritual questions. Until the times of the removal of the 'Disabilities' in Europe, he had on some occasions also to give judgment in civil matters, in accordance with the 'Choshen Mishpat,' a legal text-book, derived from the Talmudical and post-talmudical authoritative decisions.

RABBIT, n. *răb'bĭt* [prov. F. *rabotte;* Wal. *robett;* Dut. *robbe,* a rabbit]: rodent animal, which burrows in the earth and feeds on herbage. RABBIT-WARREN, open common or inclosure where wild rabbits breed in great numbers. WELSH-RABBIT [supposed corruption of *welsh-rarebit*]: well-toasted cheese spread on toast.—*Rabbit* is a common name given to some species of the hare family, the word hare being more properly applied to species that seek safety by continuous running, rather than retreating into burrows. The R. of Europe, which is familiar everywhere as domesticated, is *Lepus cuniculus.* Except in some varieties, which result from domestication, the ears are only about as long as the head. The wild R. is of grayish-brown color, paler or whitish on the under parts; the ears not tipped with black, like those of the common hare; the tail rather larger and more conspicuous—brown above, white beneath. The R. exhibits a remarkable difference from the hare in its gregarious habits; and another in the comparatively imperfect state of the young at their birth, which are blind for some days, and almost destitute of hair. It

Tame Rabbits.

delights in sandy heaths, dry grounds covered with scattered furze or juniper, and similar situations; to which, however, it is not restricted, and is often very troublesome by its depredations on crops in the finest fields having its abode in some neighboring wood; though it never makes its burrow in a wet soil. Although now very abundant in Britain, and generally throughout Europe, the R. is said to have been introduced into Britain from Spain, and even to have been originally brought to Europe from n. Africa. In a wild state the R. is monogamous, and the attachment of a pair is said to continue during life; but in domestication, it ceases to pair. The fertility of rabbits is proverbial; they begin to breed when six months old, and are capable of producing several litters in a year, of 4 to 12 or more in a litter; so that, in favorable circumstances, they multiply with prodigious rapidity; and though they have many natural enemies, would in many places become an intolerable pest to farmers, were not means adopted to

reduce their numbers. Rabbits often inflict great injury on plantations by barking young trees, seeming to take pleasure in tearing off far more than they can eat. An infusion of tobacco repels them from trees. The flesh of rabbits is in high esteem for food, and the fur being used for various purposes, rabbit-warrens are profitable in lands not suited for agriculture: see RABBIT-SKINS.

Instances have occurred of the R. and hare breeding together; but they are very rare, and the creatures seem rather to regard one another with antipathy.

Tame rabbits exhibit great variety of colors—gray, brown, reddish-black, more or less mixed with white, and often white with all the characters of albinism. Peculiarities of other kinds appear in some of the varieties, among which excessively long and drooping ears are one of the most remarkable. *Fancy rabbits* are prized and tended like *fancy pigeons*. But when rabbits are kept for economical purposes, those which differ less widely from the original type are preferred. Rabbits eat almost any kind of vegetable food; the coarser blades of cabbages, turnip-leaves, celery-tops, carrot-tops, and other produce of the garden, not suitable for human use, are readily consumed by them, as well as chick-weed, sow-thistle, dandelion, and many other weeds. With very little trouble, and still less expense, a man can easily secure one or two rabbits a week for his family from the produce of his stock. When the rabbit-inclosure contains a plot of grass and clover, it affords them an important part of their food. Great care is requisite to keep their boxes dry, neglect of which, and a too exclusive feeding with green and succulent food, cause diseases, often fatal, particularly to the young. Dry food, such as corn, ought to be frequently given; and aromatic herbs—such as parsley, thyme, milfoil, etc.—not only tend to preserve the health of the rabbits, but to improve the flavor of their flesh. It is usual to give no water to tame rabbits; but it is better to supply them regularly with it, and the females particularly need it after producing young.

An old English name for the R. is *cony*, but the R. is not the Cony (q.v.) of Scripture. The R. introduced from England into the Australasian Colonies, has multiplied to such enormous extent, as to be a serious and even alarming plague to sheep-farmers and agriculturists in New Zealand and parts of Australia. Of late, rabbit flesh has been extensively canned and sent to England as food.

The *Angora R.* is a remarkable variety, with very long silky hair, easily stripped off in summer. It is regularly reared in France.

The Gray R. (*Lepus sylvaticus*) of N. America is the most plentiful species of the genus *Lepus* in the United States, from N. H. to Fla and west to the upper Missouri. It is 16–17 in. long, the back of mixed brown and black, and the tail white beneath. It somewhat resembles the common R. in color, and is rather less in size, its habits are intermediate between those of the R. and of the hare. It does not burrow; though, when hard pressed by a pursuer,

it retreats into any accessible hole, and sometimes digs, to escape from or enter an inclosure. The Sage R. (*L. artemisiæ*) of the far west, hardly differs from the Gray R. The Jackass R. (*L. callotis*), from Or. to Tex., is named from its long ears, which measure about 5 inches.

RABBITS, in British law, rank with hares as Ground Game, and have an important place in the Game Laws (q.v.): see also GAME: POACHING.

RABBIT-SKINS, article of regular commercial value in consequence of the hair being well adapted for felting purposes: hence they are collected in large numbers by the chiffoniers of various countries, and the hair itself is frequently exported from Holland and Germany, under the erroneous name 'cony-wool.' Its chief use is in making the bodies of felt hats—now done by ingenious machinery, consisting of a hollow cone of copper, of the size of the felt cones required by the hatters. The cone is covered with perforations, and fits on a metal shaft of the diameter of its base, by means of a collar, which can be turned round by a band, so as to carry the perforated cone with it. At the bottom of the metal shaft is a fan, moved by machinery, which produces a strong downward draft, so that if the hairs are thrown against the cone, they are held tightly by the current of air through the perforations; and as the cone regularly revolves its outer surface becomes entirely coated with the rabbit-hair. When a sufficient thickness is obtained, the smooth copper cone is easily drawn out, leaving a cone of wool, which is felted by the usual processes of wetting, beating, etc. Another ingenious contrivance in this machine is to make the draft of air caused by the fan blow the rabbit-fur forward to the cone, so as to distribute it with an evenness.

The skins, after the hair has been removed, are sold to the glue-makers, and are used—mixed with shreds of other skins—in manufacture of glue and size. Besides these uses, the skins of rabbits are dressed as furs, in various ways, to supply the demand for cheap articles; and this is done with such skill as to produce admirable imitations of the more costly furs. Thus, ermine and miniver are made from white rabbit-skins, the black skins furnishing the spots; and the common variety is dressed and dyed various ways, to represent the furs of dark-colored animals. In the reign of Henry VIII., rabbit-fur was valued highly, and was worn by the nobles of the realm.

There has been a very large market in the United States for imitation furs prepared from rabbit-skins by British manufacturers; and the imports to this country have been large. Tasmania exports about 30,000 rabbit-skins per month to England.

RABBLE, n. *rab'l* [O.Dut. *rabbelen*, to gabble, prov. Ger. *rabbeln*, to prattle: Swiss, *rüblete*, an uproar, a crowd of people: L. *rabula*, a brawling advocate—from *rabo*, I rave: Gael. *rapal*, noise]: a tumultuous crowd of the lower classes; the mob; a disorderly crowd: V. to mob; to hustle. RAB'BLING, imp. RABBLED, pp. *rab'ld*. RAB'BLEMENT, n. *-mĕnt*, a tumultuous crowd of roughs or low people.

RABBLE, n. *răb'l* [etym. doubtful]: iron bar with one end bent at a right angle, used for stirring the molten iron in the puddling or boiling furnace.

RABBONI, n. *ra-bō'nī* [see RABBI]: my master, regarded as the highest title of honor among the Jews.

RABDOLOGY: see RHABDOLOGY.

RABDOMANCY: see RHABDOMANCY.

RABELAIS, *ra-ba-lā* or *ra-blā'*, FRANÇOIS: greatest of French humorists: about 1490 -prob. 1553; b. Chinon, a small town in Touraine. His father, Thomas R., was proprietor of a farm in the neighborhood, noted for the quality of its wine, the sale of which he perhaps combined with the business of an apothecary. His prosperous circumstances enabled him to give his son every advantage of education, and the boy was sent as pupil to the neighboring Abbey of Seuilly. His progress in his studies being unsatisfactory, he was removed to the Univ. of Angers. Here—though as a scholar he remained undistinguished—he was fortunate enough to make the acquaintance of Jean (afterward the renowned Cardinal) Du Bellay, to whose steady friendship he was subsequently much indebted. At the desire of his father he consented to enter the monastic state, and became a brother of the order of St. Francis, in the convent of Fontenay le Comte, according to the annalist, Pierre de St. Romuald, 1511; but the discovery of a document by M. B. Fillon (*Poitou et Vendée*, Fontenay 1861), renders the date 1519 more probable. R. now devoted himself with utmost ardor and perseverance to his hitherto neglected studies. Aiming at the widest culture attainable, he ranged the whole circle of the sciences as then understood. To medicine, in particular, he seems to have been strongly attracted; and in the sphere of language, in addition to Latin and Greek, he is said to have attained competent mastery of Italian, Spanish, German, English, Hebrew, and Arabic. Meantime, he was no favorite with his brother monks, who hated him for his devotion to the new learning, and suspected his Greek to be only a cover for heresy. About 1523 a search was made in his cell for suspicious books; the whole were confiscated, and to save himself from sharper persecution he fled. But though only a poor monk, the wit and learning of R. had gained him influential friends, through whom he obtained from Pope Clement VII. an indulgence to transfer himself from the order of St. Francis to that of St. Benedict, and became an inmate of the monastery of Maillezais. There seems no reason to suspect the least ground for the calumny afterward circulated, that his removal was necessitated by the odium attached to a life of profligate indulgence. We must infer that in his new abode he found himself not much more comfortable than before, as after a few years he quitted it abruptly, without the sanction of his ecclesiastical superiors, thereby incurring the severest censures of the church. But it was not persecution that induced this second flight from the monastic state. It was the incurable aversion of the grotesque humorist to the restraints

of the 'regular' clergy. And nobody seems to have really blamed him for his professional apostasy — his own bishop, among others, receiving him at his table in the most friendly manner. During 1524–30 he appears to have frequented the universities of Paris and Bourg; which may account for the intimate knowledge of university manners and opinions shown in his great work. In 1530 he settled himself at Montpellier, and taking a medical degree at the univ., was appointed a lecturer. In 1532 he went as hospital physician to Lyon, where he published several works on medical science; besides miscellaneous matter on archeology, jurisprudence, etc. In the beginning of 1534 his old friend, Jean du Bellay, then Bp. of Paris, and soon to be Cardinal, passed through Lyon, on an embassy to Rome, whither, in the capacity of travelling physician, R. was delighted to accompany him. While at Rome, he petitioned Paul III. for a remission of the penalties still attached to his misdemeanor above mentioned; and through the interest of Du Bellay and others, a bull was obtained absolving him and permitting his return to the order of St. Benedict. But he continued the exercise of his profession of medicine at Montpellier and other towns till 1538, when he withdrew as canon into Du Bellay's own abbey of St. Maur des Fosses, near Paris, and resumed his monastic habit. The death of Francis I. 1547, was followed by the fall of Cardinal Du Bellay—the new monarch, Henry II., favoring Cardinal de Lorraine. R. shared for a time in the disgrace of his old protector, whom he appears to have followed to Rome, but his tact and irresistible humor won him friends among the Lorraines, and 1551 he obtained the curacy of Meudon, in which the remainder of his life was passed. So far as record remains of it, his life here was happy and blameless. He was exemplary in fulfilment of duty, profuse in charity, sedulous in relief of suffering, for which his medical knowledge fitted him; and always specially delighted to cultivate the society of those eminent in learning or science. He died at Paris, in the Rue des Jardins, in the parish of St. Paul, in the cemetery of which he was buried.

The scientific treatises of R. have been, naturally, long since forgotten; but his romance, in which are narrated the wonderful adventures of Gargantua and Pantagruel, ranks as one of the world's masterpieces of humor and grotesque invention. In the form of sportive and extravagant fiction, it is a satirical criticism of the corrupt society of the period, whose prevalent follies and vices are parodied with surprising ingenuity and effect. The difficulty of its allegorical form, however, and the quantity of recondite allusion that it embodies, tend somewhat to impair its effect for many modern readers. Also, it must be said, that in his attempt to

> Cleanse the foul body of the infected world,

it is the whim of the writer to infect himself with not a little of its foulness; and such is the riotous license of the buffoonery, from behind which, as a stalking-horse, he shoots the arrows of his wit, that few books are less fitted

for general perusal in the present more decorous times. On the publication of his work, the charge of irreligion and atheism was freely preferred against R.; with certain other scandals, for which there seems to have been in his life no foundation, except as the free tone assumed by the writer might suggest a defective morality in the man. The religious corruptions of the time, and the vices of the priestly class had formed one favorite theme of his satire, and he simply paid the usual penalty in thus incurring the easy retort calumnious. See Delécluze, *Rabelais* (1841); Lacroix, *R., sa Vie et ses Ouvrages* (1859); Fleury, *R. et son Œuvre* (2 vols. 1877). The editions of R. are innumerable. Sir T. Urquhart's English translation (1653) is the basis of the more modern ones.

RABELAISIAN, a. *răb-è-lā zī-an:* resembling, or characteristic of Rabelais or his style; extravagantly grotesque or humorous.

RABID, a. *răb'id* [L. *rabĭdus,* furious—from *rabĭēs* madness; *rabo,* I rave: It. *rabido*]: furious; raging; mad—especially applied to a dog when suffering from the disease *rabies.* Rab'idly, ad. *-li.* Rab'idness, n. *-nès,* the condition of being rabid; madness.

RABIES, n. *rā'bēz* [L. *rabies*, madness—from *rabo*, I rave]: disease of dogs—hence of other animals—in which, should their saliva be absorbed into the human system by a bite or through a scratch, the disease called *hydrophobia* is produced (see RABID).—*Rabies*, as affecting the dog and other animals, was known to the ancients, and is spoken of by Aristotle, Pliny, and Horace, but it does not seem to have been then so virulent in its nature, or alarming in its consequences, and Aristotle, perhaps in ignorance, states that man was not subject to its attacks. It was prevalent on the continent of Europe two or three centuries ago, but was comparatively rare in Britain till the 18th c. This malady stands almost alone in this, that all animals seem liable to its attacks.

It is in dispute among some of the best authorities whether R. be occasionally *spontaneous* in the carnivora—the only animals in which it is undoubtedly inherent, or communicated solely by *inoculation*.

Looking simply at the *history* of the disease, the facts seem against the spontaneity theory. R. is not known in some countries, e.g., the Cape of Good Hope, s. Africa, Egypt, Syria, South Sea Islands, Lisbon, where dogs swarm; and in Constantinople where they go at large, and support themselves on offal of all kinds and qualities, the disease is very rare. John Hunter relates that it was not known in Jamaica for forty years previous to 1783, when it was introduced by a dog from America; and Dr. Hamilton says that curs of the most wretched sort abound in the island of Madeira that they are afflicted with almost every disease, tormented by flies, by heat, thirst, and famine, yet no rabid dog was ever seen there. There is often, no doubt, great difficulty in tracing the cause of R. from inoculation. The owner may feel convinced that his diseased dog had almost never been out of his sight, or exposed to an affected animal; but when we consider the predatory habits of the dog, and his love of association, and how easily he can steal away unobserved by night or by day for a longer or shorter time, we can readily account for the most vigilant eye failing to detect the occasion of the disease. It has been asked, as an objection to the exclusiveness of contagion or inoculation, How was R. at first originated? But the same difficulty attends small pox and other diseases which now arise only from contagion: the question is irrelevant.

On another important peculiarity in this disease medical men are divided—whether the virus of a rabid animal, other than of the *carnivorous* species, can communicate the disease. Experiments to test this were made by surgeons of eminence in various countries, and by Drs. Vaughan and Babington of London, and at the Royal Veterinary College; and it is reported that in every instance they failed in producing the disease. It is certain, however, that others have not so failed. Majendie and Brechet 1823 inoculated two dogs with the saliva of a hydrophobic man, and it resulted in one of the dogs becoming rabid, which in turn communicated the disease to other dogs and some

sheep. The well known London surgeon, Earl, in administering medicine to a hydrophobic woman, was bitten by her, and he immediately excised the bitten part. Being accused of unnecessary fear and cowardice, he determined to justify his fears, and having inoculated several rabbits with the woman's saliva, some of them became rabid. In Bath the disease was produced in a common hen by the virus from a cow. The following are remarks by Youatt: 'I can imagine that the disease shall not be readily communicated by the saliva of a graminivorous animal; but I have once produced it in the dog with the saliva of an ox, and twice with that of the horse, but I have failed to do it in very many cases.'

Some leading *symptoms* of R. in the dog and horse are to be noted. These may be exhibited in the dog in a few days, or often weeks, and even months after he has been bitten. At first he loses his appetite, becomes sullen, fidgety, has a vacant gaze, licks or gnaws the injured part, laps any liquid that comes in his way—for he has, unlike man in this disease, no dislike for water, though he has a difficulty in swallowing it—eats wood, straw, hair, and other indigestible substances; and in a day or two he becomes quarrelsome, bent on mischief, bites at anything that comes in his way, and his bark is more like a howl; his lower jaw often becomes pendulous, and general paralysis sometimes precedes death; and as a rule, on the fifth or sixth day he dies. The principal post-mortem appearances are these—enlargement and increased vascularity of the salivary glands, inflamed condition of the base of the tongue and fauces, epiglottis, and stomach, which last organ almost invariably contains such indigestible substances as straw, hair, offal, etc. The symptoms in the horse, which become apparent in a few weeks, are those of extreme irritability. He trembles, heaves, and paws, staggers, and falls; and after a severe struggle, he suddenly rises again, and appears settled and collected, when he will again exhibit the usual distressing symptoms. He is sometimes mischievous, bites, foams, and snorts; and generally in three days he dies paralyzed and exhausted.

The Fr. chemist Pasteur (q v.) began his study of R. 1880, and reached the conclusion that it is a disease transmissible from one animal to another by inoculation of the latter with those various secretions and tissues of the affected animal in which the virus of R. exists. Further, the virus is, according to him, a living organism. He finds that the virus exists in the nervous system and in the saliva, but not in the blood, lymph, etc.: hence inoculation into the blood of a rabid animal does not convey R. But there is a sure means of communicating R., viz., by introduction under the dura mater, on the surface of the brain, of a liquid, first sterilized, in which a portion of the central nervous system of a rabid animal has been soaked: R is infallibly produced in this way, unless the animal under experiment is refractory to the disease. In the course of his researches Pasteur observed that, in certain groups of animals which

have been inoculated beneath the skin with large quantities of rabic virus, some not only did not take R. but became incapable of taking it, i.e., they might with impunity be inoculated on the brain surface with the virus. This suggested the idea of preventive inoculation for R.

The principle of preventive inoculation is as follows: The spinal cord of a rabbit that has died of R., when preserved in dry air at the temperature of 74°—76° F., slowly loses its virulence. After it has stood 14 days, it will not communicate R. to a rabbit or dog; yet it still has a certain power to confer immunity from R. At the same time Pasteur observed that the freshest spinal cords—the most virulent—are those best fitted to confer immunity from infection. Hence to render an animal refractory to infection, the treatment begins with an inoculation of spinal cord 14 days old, then with that 13 days old, and so on till spinal matter not yet one day old is employed: after that the animal is absolutely refractory to rabic virus.

Pasteur declares that this treatment, resorted to promptly after one has been bitten by an undoubtedly rabid animal, prevents the development of the disease: see HYDROPHOBIA.

RABOT, n. *rā'bŏt* [F. *raboter*, to plane, to smooth]: a hard-wood rubber used in rubbing marble to prepare it for polishing.

RACA, n. *rā'kä* [Chaldee, *rēkä*, worthless]: an expression of extreme contempt among the anc. Jews, expressing 'beggarliness, vanity, or folly.'—(Matt. v. 22).

RACCAHOUT, *răk'a-hŏt'*: a farinaceous food imported from the Barbary coast, and sometimes recommended to invalids. It is believed to consist of the meal of the acorns of the Barbary Oak (*Quercus Ballota*), flavored with some aromatic herb. It must not be confounded with Tacahout (q.v.).

RACCONIGI, *rāk-kō-nē'jē*: town of Piedmont, 24 m. s. of Turin. Its palace is one of the country residences of the royal family. Silk fabrics and twist, and woolen cloths are manufactured. Pop. 8,210.

RACALMUTO, *rä-käl-mōō'tō*, or RAGALMUTO, *rä-gäl-mōō'tō*: inland town of Sicily, province of Girgenti, on the crest of a hill 12 m. n.e. from Girgenti. It is said to be of Saracenic origin. It has a castle, built by Frederick Chiaramonte, 14th c. Pop. 11,000.

RACCOON: see RACOON.

RACE, n. *rās* [F. *race*—from It. *razza*, race, family. Sp. *raza*, a race, a ray or line of light. OF. *rais*, a root, the stock of the family: OHG. *reiz* or *reiza*, a line: L. *radix*, a root]: a continued series of descendants from a parent, called the 'stock': a family, a succession of the same class, a particular breed, sort, or variety, a generation (see below). in *bot.*, a permanent variety, the particular strength, taste, or flavor of wine, indicating its kind and origin; smack. see RACY. RACE GINGER [OF. *ras*, root]: ginger in the root, i.e., not pulverized. RACIAL, a. *rā'shăl*: pertaining

to a race or family of ancestors. 'A *Race* is a class of individuals concerning which there are doubts as to whether they constitute a separate species, or a variety of a recognized one. Hence the term is *subjective;* i.e., it applies to the *opinion of the investigator* rather than to the *object of the investigation;* so that its power is that of the symbol for an unknown quantity in algebra. The present writer having as yet found no tribe or family [of man] for which a sufficient reason for raising it to a new species has been adduced, has either not used the word *race* at all, or used it inadvertently. Its proper place is in *investigation*, not in exposition.'—Latham, *Nat. History of the Varieties of Man.* RACES OF MEN: see ETHNOLOGY.—SYN. of 'race': progeny; issue; lineage; family; house; line; breed; offspring.

RACE, n. *rās* [AS. *ræs*, a course, a stream; *reosan*, to rush: OF. *esracer*, to pluck off or pull down: Ger. *reissen*, to rage or tear: Pol. *raz*, a stroke or blow: Icel. *rás*, a rapid course: OF. *rase*, a mill-race]: a rapid course, whether of animals or of a river; any running with speed; a contest in running; progress; course; career; the tide-wave when arrested by a promontory, and caused to flow off obliquely with considerable velocity, as the 'race of Portland'; the water-course leading to a water-wheel. RACES, n. plu. *rāsiz*, a meeting at which horses contend against each other in running. RACE, v. to run swiftly; to run or contend in a race. RAC'ING, imp. RACED, pp. *rāst.* RACER, n. *rās'ir*, a race-horse. RACE-COURSE, the road staked off in which horses contend in swiftness of running; the canal along which the water is conveyed to a water-wheel—called a *mill-race.* RACE-HORSE, a horse bred and trained to run in the race-course; also a breed of horses distinguished for extreme fleetness. It owes its origin in great

Race-horse.

measure to Arabian, Barbary, and Turkish horses introduced into England, and later into the United States. The great interest taken in HORSE-RACING (q.v.) since the time of James I., has led to the greatest care of the animals employed in it, and the utmost improvement of the breed. The race-horse is generally longer bodied than the hunter.

RACE: portion of a loom from which the shuttle is projected through the shed, or separated threads of the warp.

RACEME, n. *rā-sēm'* [F. *racème*, a cluster—from L. *racēmus*, a cluster of grapes], in Botany, an indefinite Inflorescence (q.v.) which is *centripetal* (see CENTRIFUGAL AND CENTRIPETAL), in which there is a common axis or stem, and in which the flower-stalk throws off branchlets (*pedicels*) of nearly equal length, each bearing a single flower. Familiar and perfect examples of the R. are seen in the Red or White Currant and in the Barberry. Notwith-

a Pendulous Raceme (Red Currant), *b*, upright raceme (Lily of the Valley).

standing the origin of the name, a bunch of grapes is not a true R., but a Panicle (q.v.). RACEMED, a. *-sēmd*, having a raceme or racemes. RACEMIC, a. *-sē'mik*, a peculiar acid found in the tartar obtained from the grapes of certain vineyards on the Rhine, called *paratartaric acid*: see TARTARIC ACID. RACEMATION, n. *rā-sē'-mā'shŭn*, a cluster, as of grapes; their cultivation. RACEMIFEROUS, a. *-mif'er-us* [L. *fero*, I produce], bearing racemes. RACEMOUS, a. *-mus*, or RACEMOSE, a. *-mōs*, bearing flowers in racemes or clusters. RACEMULE, n. *rās'ē-mūl*, in *bot.*, a small raceme. RACEMULOSE, a. *rā-sem'ū-lōs*, bearing very small racemes.

RACHEL, *rā-shel'*, ELISA (true name ELIZABETH FELIX): renowned French *tragedienne:* 1820, Mar. 24 (or 1821, Feb. 28)—1858, Jan. 4; b. Mumpf, canton of Aargau, Switzerland; of Alsatian Jewish parents who travelled as pedlers. The family removed to Lyons, France; and to aid in its support, the child R. and her sister Sarah were in the habit of singing for chance gratuities in the streets and cafés of the city. In 1831 the household was transferred to Paris, and for R., lessons were procured in singing from an eminent teacher of the day. In music, she gave no promise of special excellence; and 1833, she made her first appearance on the stage as an actress. Though her talent had previously been discerned by some judicious critics (among others, Jules Janin and the famous Mademoiselle Mars), it was not till 1838 that in the character of Camille, in Corneille's tragedy *Les Horaces*, that she first strongly attracted public attention. The admiration excited by

her performance rapidly grew into enthusiasm; thenceforward in the great parts supplied by the classic masterpieces of Corneille, Racine, and Voltaire, she shone without a rival. In 1843 her fame culminated in her appearance as *Phèdre* in the tragedy of that name by Racine. In *Adrienne Lecouvreur*, also, a piece written expressly for her by Legouvé and Scribe, she had immense success, though in more modern parts, her popularity was somewhat less. The *furor* excited in Paris, 1848, by her public recitation of the *Marseillaise Hymn*, in the interest of the revolutionary govt., will continue to connect her name with the public history of the period. In 1849 she made the tour of the French provinces, and subsequently visited England and Russia, everywhere meeting enthusiastic recognition. Her health, however, had begun to fail: in 1855, during a professional visit to America, it altogether gave way, and she returned utterly prostrated. A residence at Cairo failed to restore her to strength; and she died at Cannet, near Toulon. As an artist, within the limits prescribed by her genius, she has probably never been quite equalled. Of the burning intensity which characterized her rendering of passion in its fiercer concentrations, no words can give an adequate image. 'She does not act—she suffers,' some one well said of her. Her *Phèdre*—by common consent her masterpiece—was an apocalypse of human agony, not to be forgotten by any who ever witnessed it. In character, R. was neither exemplary nor amiable. Of the details of her private life, it is as well that nothing be said. In her professional relations, she was notoriously grasping and avaricious. Her immense popularity enabled her, during much of her career, to dictate her own terms to managers, and of this power she is said to have availed herself without scruple—thus rapidly amassing a large fortune. If little else of good is on record of her, she was constant in her home affections, and throughout she frankly made her whole family sharers of her prosperity. See Life by Mrs. Arthur Kennard (1886).

RACHIS, n. *rā'kĭs* [Gr. *rhachis*, the spine or backbone]: in *bot.*, the *primary floral axis*, an elongation of the stem or of a branch from which arise the flower-stalks (peduncles); that part of a culm which runs up through the ear of corn; the stalk of the frond in ferns; the common stalk bearing the alternate spikelets in some grasses: in *zool.*, the vertebral column in mammals and birds. RACHITIC, a. *rā-kĭt'ĭk*, pertaining to the muscles of the back; rickety. RACHITIS, n. *rā-kī'tĭs* [Gr. *rhachitis*, a spinal complaint]: the diseased state of the bones called rickets; in *bot.*, a disease producing abortion in the fruit or seed.

a. Rachis: *Lolium Perenne* (Rye-grass).

RACINE, *ra-sēn'*: city; cap. of Racine co., Wis.; on Lake Michigan, the Root river, and the Chicago and N. W. and the Chicago Milwaukee and St. P. ailways; 25 m. s. by e. of Milwaukee. It is built up on a plateau 40 ft. above the lake-level and 690 ft. above sea-level; is laid out regularly in broad streets that cross each other at right angles; and has an excellent harbor. The city has a large coal and lumber trade and a growing share in the large traffic of the great lakes. It has daily steamboat communication with Chicago and the n. lake ports, and a large fleet of local sailing-vessels. In 1890 there were reported 190 manufacturing establishments, employing $11,533,207 capital and 4,872 persons, paying $3,448,498 for wages, $662,448 for miscellaneous expenses, $4,349,308 for materials; and having an output valued at $8,462,359. The leading industries were the manufacture of agricultural implements, carriages and wagons, leather trunks and valises, and malt liquors. In 1890 the city had a court house, city hall, Racine Co. Insane Asylum, Taylor Orphan Asylum, St. Luke's Hospital, St. Mary's Hospital, 37 churches, a high school, 8 public school buildings, 6 private schools, including the convent of the Sisters of St. Dominic, Racine College (Prot. Episc., organized 1853, with 7 instructors, 50 students, and 10,000 vols. in its library, St. Catharine's Acad. Rom. Cath., opened 1866, the McMurphy Home School (Prot. Episc., opened 1877), 3 national banks (cap. $625,000), a state bank (cap. $100,000), and a semi-monthly, 2 daily, and 6 weekly periodicals. In 1891 the assessed valuations were: Real estate, $7,721,430, personal, $2,025,570—total, $9,747,000 and 1895, Feb. 1, the net debt was $292,759. The city has gas, sewerage, electric light, and electric street railway plants, and a new system of water works, supplied from the lake. It was settled 1836 and incorporated 1848. Pop. (1880) 16,031; (1890) 21,014.

RACINE, *ra-sēn'*, JEAN: most admired of French dramatists; 1639, Dec. 21—1699, Apr. 12, b. Ferté Milon; of a respectable family belonging to the *bourgeoisie*. At the age of four he lost both parents, and went to live with his maternal grandfather, by whom he was sent to the College of Beauvais. Here he remained till the age of 16, at which time his grandfather died. He was then taken to Port-Royal (q.v., where his grandmother and his aunt Agnes were leading a recluse life, and placed at the school which had been opened in that celebrated retreat by the pious scholars assembled there. R. astonished his teachers by rapid progress in all his studies, especially Greek; but he won their regards still more by the affectionate seriousness of his character, which gave delicacy to his ardent sensibilities and vivid imagination. They loved him, yet they trembled for him. When they saw him wander—Sophocles or Euripides in his hand—among the shadows of the abbey, they were anxious in his behalf; and when they learned that he secretly indulged in the sinful pastime of making verses, they thought it necessary even to punish their favorite. Their punishment was indeed an odd one, for they compelled him to turn the hymns of the Roman

breviary into French verse. Novels were placed under the same ban as poetry. One day the sacristan Lancelot found him reading the Byzantine romance of Bp. Heliodorus (q.v.), entitled *The Loves of Theagenes and Charicleia*, and threw the book in the fire; but R. says that it was already fixed in his memory, and that he smiled at this futile attempt to rob him of it. It is evident that R. was not at all ascetically disposed as yet. After a residence of three years at Port-Royal during which time he had, among other things, read and annotated the best Greek and Latin classics, he went to the Collége d'Harcourt to finish his curriculum with the study of logic. Then he went out to 'see life,' fell into loose company, became irregular himself, and even grew so reckless as to burlesque, in his correspondence, the pious phraseology in vogue at Port-Royal. Deep was the grief and incessant were the remonstrances of his old friends, but they were long without avail. He had made some little name as a poet by an Ode on the marriage of the king, and had had the good fortune to get a pension for it; still his income was small and precarious; and when a maternal uncle, a canon-regular of the church of St. Genevieve at Uzès, Languedoc, held out to him the hope of a benefice, R. went to live with him 1661, and tried to study systematic theology. But the effort was hopeless. While he gazed vacantly into the *Summa* of St. Thomas, his thoughts were with Ariosto and Sophocles. In the summer of 1662, he returned to Paris in disgust, and commenced life as a dramatic writer, having meanwhile made the acquaintance of Molière and Boileau. His first piece was the *Frères ennemis*, played 1664; but it was not till 1667, when his *Andromaque* appeared, that the power and peculiar character of his genius excited marked attention. For the next ten years, his career as a dramatist was unsurpassably brilliant, yet, strange to say, we know almost nothing of his private or social life during that time. We have to content ourselves with a few meagre facts relative to his literary performances, of which the chief were *Britannicus*, *Bérénice*, *Bajazet*, *Mithridate*, *Iphigénie*, and *Phèdre*. Suddenly, at the early age of 38, in the full sunshine of his fame and vigor of his power, he resolved to abandon both the stage and the world, and become a Carthusian monk. In the midst of all his literary ambitions and strifes, his little excesses, irregularities, and amours, R. had carried with him a keen and faithful conscience; and partly from disappointment, partly from remorse, he longed to forget all in acts of devotion. With difficulty he was prevailed on to modify the rigor of his purpose, and instead of seeking for religious felicity through the privations of solitude, and the severities of penance, to do so through marriage with some pious woman, and the cultivation of domestic virtues. A suitable lady—very devout, but not very intellectual—was found for the poet in the daughter of the city-treasurer of Amiens, and the marriage took place 1677. Two sons and five daughters were the fruit of this union. Shortly after his marriage, R. was appointed historiographer to the king. Thenceforth, his

course of life was pursued with utmost regularity—one-third of the day being given to religious duties, a third to his family and friends, and the remainder to the king. His *Esther* (1689) and *Athalie* (1691) are the only dramas which he produced after his conversion; and they are profoundly imbued with religious feeling. *Athalie* is reckoned by some his finest effort; certainly the only one which can at all be placed in comparison with it is the *Phèdre*.

R.'s dramatic genius was essentially French, or pseudo-classical; therefore it is not easy for Englishmen and Americans, trained to appreciate the power, magnificence, and variety of the Shakespearian tragedy, to sympathize with it, or to criticise it impartially. In the eyes of his countrymen, he is the most perfect, if not the most sublime, of all their dramatists. Corneille may at times exhibit a grander and more rugged energy; but in beauty, grace, and a certain tender majesty of style, R. is without a rival; and it must be remembered that *style*, and not portraiture of human character, is the thing in which French dramatists aim to shine. The declamations in which the heroes and heroines of R. indulge, are marvellously fine pieces of rhetoric, but, compared with the Elizabethan drama, they are deficient in deep insight into human nature and in genuine passion, while humor is altogether excluded. See *Mémoires* of R., edited by his son Louis. The editions of his works are innumerable.

RACINESS: see under RACY.

RACK, v. *rak* [OF. *vin raqué*, coarse wine squeezed from the dregs of the grapes]: to decant or strain, as wines: to draw wines off the lees. RACK'ING, imp.: N. the act of drawing off liquors from the lees. RACKED, pp. *rakt*.

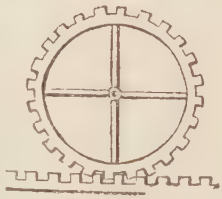
RACK, v. *rak* [Dut. *rekken;* Ger. *recken*, to stretch: AS. *racan*, to extend: Dut. *rack*, a frame on which torture was inflicted by stretching the joints: Gael. *rac*, to tear, to pull asunder]: to strain; to stretch; to torture by stretching; to torment; to affect body or mind with extreme pain or anguish: *N.* instrument for stretching; engine of torture (see below): extreme pain; anguish. RACK'ING, imp.: ADJ. distressing; torturing; tormenting. RACKED, pp. *rakt*. RACK'ER, n. *-er*, one who racks, twists, or distorts. RACK-RENT, n. the full yearly value of lands let on lease, or to an occupier, or held by a tenant for life, as distinguished from the value fixed by the lease or agreement between the parties, and which is often less or greater than the real value; rent of premises unduly raised, and beyond the real value. RACK-RENTED, a. subject or liable to excessive rent. TO PUT TO THE RACK, to subject to extreme torture, to torment. TO RACK ONE'S BRAINS, to strain them to the uttermost. RACK STICK, in *mil.*, a picket 18 in. long, with about 8 ft. of rope attached, for locking down planks of a platform or a bridge.—SYN. of 'rack, v.': to rend; tear; torture; torment; stretch; extend; wrest.

RACK, n. *rak* [AS. *hracca*, the neck: Ger. *rücken:* Dan. *ryg*, the ridge or back]: neck or spine of a fore-quarter of veal or mutton.

RACK, n. *răk* [Icel. *reka*, to drive; *rek*, drift, motion]: the drift of the sky; thin, flying, broken clouds—not to be confounded with *reek*, a mist or vapor; a trace; a track. RACK'ING, a. drifting.

RACK, v. *răk* [Scot. *rack*, crash, uproar: Gael. *racaid*, a noise, a great disturbance; connected with RACK 5 (see RACKET)]: in *prov.* and *old E.*, to go to ruin and destruction, as in the phrase 'gone to *rack*': N. complete ruin and disintegration of parts. RACK AND RUIN, complete destruction and dissolution, as of means or estate.

RACK, n. *răk* [Low Ger. *rakk*, a bookstand: Ger. *rack*, a rack, rail: Dut. *reke*, a rake or comb; *rek* or *rak*, a dresser, a clothes-horse]: receptacle for hay for feeding horses, etc., formed of a range of upright bars; a frame in which articles may be placed or spread out, as a *plate-rack;* the frame from which the yarn or thread is drawn in spinning: in *mining*, an inclined plane on which the ore is washed and separated from the slime or earth. *Rack* in machinery is a straight flat bar with cogs or teeth on one side to correspond and work into similar cogs or teeth placed on a wheel, thus: If the bar is not movable, the wheel is attached to a traversing frame, and as it revolves, is moved along by the resistance of its teeth to those on the bar. It was in this way that the formation of a railway was first projected; the rail and the driving-wheel of the engine both to be furnished with corresponding teeth. In mechanics, rack-work has innumerable applications.



Rack-work.

RACK: instrument of torture formerly used for extracting confessions from criminals. It consisted of a large oblong frame of wood, with four beams a little raised from the ground, on which the sufferer was stretched and bound. Cords were attached to his extremities, and gradually strained by means of a lever and pulleys, till the operation, if persisted in, caused dislocation of the limbs. The rack was known in the 1st and 2d c. in s. Europe, and was applied in the persecutions of the early Christians. It was in use in England in the 15th and 16th c. According to Coke, it was introduced into the Tower, by the Duke of Exeter, Constable of the Tower, 1447, whence it came to be called the 'Duke of Exeter's daughter.' It is mentioned by Holinshed 1467; but its use became common first in

Tortured on the Rack.

the time of Henry VIII. as an implement of torture for prisoners confined in the tower. The infliction of the punishment of the rack took place during the reign of the Tudor sovereigns by warrant of council, or under the sign-manual. In 1628, however, on the murder by Felton of the Duke of Buckingham, it being proposed in the Privy Council to put the assassin to the rack, in order that he might discover his accomplices, the judges resisted the proceeding, as contrary to the law of England. In various countries of Europe the rack was much used both by civil authorities in cases of traitors and conspirators, and by officers of the Inquisition to extort a confession of heresy. It is no longer in use in any part of Europe.

RACKET, n. *rak'et* [Scot. *rack*, crash, shock; prov. E. *racquet*, the noise made in striking the hands together; F. *raquette*, racket, signifying in OF. the palm of the hand—from Ar. *rahat*, the palm of the hand]: irregular clattering noise: English game becoming popular in the U. S.: a modern variety of the old game of Tennis (q.v.); also, the bat or battledore used at tennis. V. to make a confused noise or clamor, to strike as with a racket. RACK'ETING, imp. RACK'ETED, pp. RACK'ETY, a. *-ti*, noisy.

RACKING-PACE, n. *rak'ing* [lit., *rocking-pace*, from ROCK 3, which see]: short paced, swift amble of a horse—a gait in which while the motion of the fore feet is that of a slow gallop, the motion of the hind feet is that of a trot: this gait is usually artificial, sometimes natural. It varies according as the horse puts one or the other forefoot forward. The motion of the hind feet is the same in the trot, the pace, and the rack. RACKER, horse whose gait is a rack.

RACOON, or RACCOON, n. *rak-k-n'* [native N. Amer. word; F. *raton*, a small rat], (*Procyon*), genus of quadrupeds of the Bear family, *Ursida*, but differing widely from the typical members of that family, in being less perfectly plantigrade, the whole sole of the foot being indeed rested on the ground when the animal is still, but being partly raised when it walks, while when running it touches the ground with only the tips of its toes, and moves in a bounding manner. The dentition also differs from that of bears, e.g., there are only six instead of seven molars on each side in the lower jaw. The dentition indicates aptitude for both animal and vegetable food. The general appearance may be described as intermediate between that of a fox and of a bear in miniature. The racoons are exclusively American. The Common R. (*P. lotor*) is a native of N. America, from Newfoundland, and farther n. in the interior and on the Pacific, to the s. of Mexico. It is grayish white, the hairs tipped with black, and the under parts dark-brown; the muzzle white. The hair is of two kinds, an under-coat soft and woolly of uniform gray; and long and rather stiff hairs projecting through the wool, and alternately marked with black and grayish-white. The R. frequents the sea shore and the margin of swamps and rivers. It commits great ravages on fields of Indian corn, plantations of sugar cane,

etc., and is destructive to poultry. It feeds much on oysters, particularly in the alluvial coast-lands of the Carolinas and neighboring regions, where the oyster abounds on the banks of rivers and creeks; and it exhibits great dexterity in opening oysters. It is very fond also of crabs and other crustaceans. It has a curious habit of dipping or washing its food in water, whence its specific name *Lotor* (Lat. washer). When pursued, it often takes refuge in a tree, climbing with great agility, but its destruction is then considered sure, whence the proverbial reference to a *tree'd 'coon*. The fur of the R. is used in manufacture of hats, and is a considerable article of commerce.—Another species, the CRAB-EATING R. (*P. cancrivorus*), the Crab-dog of Guiana, is found in S. America

Racoon (*Procyon lotor*).

east of the Andes. It is rather larger than the common R., though very similar to it.—Both species of R. show the same love of glittering things, which is so remarkable in magpies, jackdaws, and others of the crow family. Wood mentions in *Natural History* that a common R. did its best to get a ring off his finger by hitching one of its crooked claws into the ring, and pulling with all its strength; and a gentleman once resident in Guiana informed the writer of this article that a crab-eating R., which he caught young, and completely tamed, showed such a propensity to steal silver spoons, that he was compelled to send it away into the woods.

RACOONDA, *ra-kōn'da*, or NUTRIA, *nū'trĭ-a:* fur of the Coypu (q.v.).

RACO'VIAN CAT'ECHISM: catechism, or properly two catechisms, pub. 1605 and 08, containing a popular exposition of the Socinian creed; named from Racow (Lat. *Racovia*), town of Poland where was a Socinian college. The larger was translated into English in 1652, probably by John Biddle.

RACQUET, n. *răk'ĕt:* another spelling of RACKET.

RACY, a. *rā'sĭ* [Ger. *reizen;* Sw. *veta*, to provoke, to entice: Bav. *rassen*, to incite or stimulate: Swab. *ress*, sharp in taste: Swiss, *räss*, sharp, cutting (see RACE 2)]: pungent; piquant; having a strong flavor, indicating its

origin; fresh; rich; exciting to the mental taste; piquant and peculiar, applied to thought or language. Ra'cily, ad. *-li*. Ra'ciness, n. *-si-nĕs*, the quality of being racy, or piquant and peculiar. Syn. of 'racy': spirited; lively; piquant; smart; spicy; fresh; sparkling; rich.

Rac Z, *rats*, or O Becz, [illegible]: town of Hungary, in the Servian Wojwodschaft, on the right bank of the Theiss, 26 m. n.e. of Peterwardein. It has extensive trade in corn. Pop. (1880) 15,040.

RADACK, *rā'dăk*, and RALICK, *rā'lĭk*: two parallel chains of islands in the group called Marshall's Islands: see Polynesia.

RADDLE, v. *răd'dl* [from Eng. *reed*, which see]: to twist together. N. a long stick used in hedging, a hedge formed by interweaving the shoots and branches of trees; in *domestic weaving*, a wooden bar, with a row of upright pegs, used to keep the warp in a proper position when wound upon the beam [Scot. *rad*, to disentangle, to put in order]. Rad'dling, imp. *-dling*. Rad'dled, pp. *-dld*.

RADDLE: see Reddle.

RADCLIFFE, *răd'klĭf*, Ann (Ward): most popular English novelist at the close of the 18th c.; 1764, July 9 – 1823, Feb. 7; b. London. In her 23d year she married William R., who became proprietor and editor of a weekly newspaper, the *English Chronicle*. Mrs. R. lived much in retirement, known to only a few friends by whom she was warmly esteemed. Her works are *The Castles of Athlin and Dunbayne* (1789), *A Sicilian Romance* (1790), *The Romance of the Forest* (1791), *The Mysteries of Udolpho* (1794), *A Journey through Holland*, etc. (1794), and *The Italian* (1797). Mrs. R.'s popularity was constantly increasing down to the date of her latest work, when, in her 33d year, as Scott remarked, 'she chose to retreat . . . in the full blaze of her fame.' She lived 26 years afterward. For the copyright of her *Mysteries of Udolpho*, her best work, she received £500; and for that of *The Italian*, £800—perhaps the largest sums given in Britain for works of fiction until the great era of the Waverley novels. A sixth romance, *Gaston de Blondeville*, and a collection of *Poems* by Mrs. R., were published after her death.

As a novelist, Mrs. R. is pre-eminent for vivid poetical imagination, and for power of romantic narrative and description. Her paintings of external nature, and of scenes of feudal pomp, gloom, terror, or mystery, are unrivalled in modern romance. In awakening curiosity and enchaining attention, she is no less skilful. She keeps her readers in breathless awe and suspense; but in the end, when she resolves all the seemingly supernatural agencies and horrors of her tales into simple natural causes, she unquestionably fails; for her explanations are inadequate to the effects produced. She has little variety in characterization, few striking individual portraits, and no wit or humor. Hence her works, with all their gorgeous pictures and potent spells, seldom interest beyond the period of youth.

RAD'CLIFFE, John, M.D.: English physician; founder of the Radcliffe Library at Oxford: 1650–1714, Nov. 1; b. Wakefield, Yorkshire. He studied at the grammar-school of his native town; and at the age of 15, was sent to University College, Oxford; he took his degree of M.A. 1672; studied medicine, and began to practice at Oxford. He was conspicuously original in his ideas and treatment, totally disregarding and even ridiculing the usual rules of the profession. At the beginning of his practice he made some remarkable cures; and in less than two years, was gaining celebrity. In 1682 he took the degree M.D., and he practiced in Oxford two years longer.

In 1684 Dr. R. removed to London, and in less than a year became the most popular physician of his time. It is said that his conversational powers, wit, and pleasantry contributed largely to this result. In 1686, Princess Anne of Denmark made him her physician. After the Revolution, he was sent for by King William, and consequently by most of the influential persons about the court. Dr. R., however, was no courtier. Blunt in his manners—some say even *brutal*, he was recognized as having that quick perception and keen observation of symptoms so important in the healing art; and he received fees of unprecedented amount.

In 1694 he was called to attend Queen Mary when attacked by the small-pox. It was her last illness, as Dr. R. predicted before seeing her—merely on reading the prescriptions of the other physicians in attendance. His efforts for her were vain; and some attributed her death either to his lack of skill or to his negligence. About this time he offended Princess Anne, who, having sent for him to St. James's, had the mortification to hear that he swore that all her ailments were nothing else than 'the vapors.' This, with her knowledge of Dr. R.'s too great fondness for the bottle, caused her to appoint Dr. Gibbons in his place. Still, the king continued to employ him; once sending for him to the Netherlands to attend his favorite, the Earl of Albemarle, for which he received £1,200 from the king, and £400 from the patient himself, besides a diamond ring. To the king he frequently spoke with much plainness concerning his ailments; once, however, near the end of 1699, he took too great a liberty: for when the king showing him his swollen ankles, asked what he thought of them, Dr. R. replied: 'Why, truly, I would not have your majesty's two legs for your three kingdoms.' He was not again consulted by that sovereign, who soon died.

In 1713 he was elected M.P. for Buckingham. He was at his country house at Carshalton, 1714, when Queen Anne was attacked with her last illness. Dr. R. was summoned, but either would not or could not come: he had taken physic, he said, and it was impossible for him to attend. When the queen died, the populace were so enraged against Dr. R., that he dared not again show his face in London. He must have been really ill when sent for to the queen, as he survived her only two or three months. Dr. R. died of gout at Carshalton, and was buried at Oxford in St. Mary's

Church. He bequeathed his whole property to various public uses. To University College he left his estate in Yorkshire, for endowment of two fellowships, etc., together with £5,000 for enlargement of the college buildings. He left £40,000 for the erection of a public library in Oxford, since known as the Radcliffe Library (q.v.), which he also endowed. To St. Bartholomew's Hospital, London, he left yearly sums, and the rest of his property he gave to his executors in trust for such charitable purposes as they might approve. The Radcliffe Infirmary and Radcliffe Observatory, at Oxford, were erected out of this fund.

RADCLIFFE COLLEGE: institution of higher learning, founded at Cambridge, Mass., 1879, for the education of women, and popularly known as 'the Harvard annex;' named in honor of Anne Radcliffe, founder (1643) of the first Harvard scholarship. Instruction is given by the professors and teachers of Harvard, and degrees are signed by Harvard's president. In 1896 R. C. had 334 students and 84 instructors; its library contained more than 8,000 vols.

RADCLIFFE LIBRARY, Oxford, England: founded by Dr. John Radcliffe (q.v.). The building, in the central area of Radcliffe Square, is in the form of a rotunda, upon arcades, from the centre of which rises a spacious and well-proportioned dome, 84 ft. in height from the pavement. Over the entrance door hangs the portrait of the founder by Sir G. Kneller. The library contains mostly works on natural history, physical science, and medicine. Other benefactions have bequeathed to it collections in various departments. The librarian reported (1856) the no. of vols. in the departments of medicine and science as between 14,000 and 15,000. Since 1861 the spacious room in the Radcliffe Library has been open as a reading-room in connection with the Bodleian Library.

RADEGUNDA, *radehegúndi*, SAINT: daughter of Berthar, Prince of Thuringia, in the earlier part of the 6th c.; d. 587, Aug. 13. Having been carried as a prisoner to France in the 12th year of her age by Clotaire, king of the dist. whose cap. is now called Soissons, she was educated in the Christian religion, and when she reached maturer age, was induced, reluctantly, to become the wife of Clotaire. Her own wish having been to become a nun, her married life was largely given to works of charity and religion, and Clotaire complained that he 'had married a nun rather than a queen.' Eventually, about 553, she obtained his leave to retire to a monastery at Noyon, where she was consecrated a deaconess by Bp. Medard. Soon afterward, she founded a monastery at Poitiers, in which she lived as a simple sister, but which she endowed richly. At the translation to her church at Poitiers of a relic of the holy cross, the Christian poet Venantius Fortunatus composed the celebrated and magnificent hymn *Vexilla Regis Prodeunt*. R.'s life has formed the subject of many beautiful legends, still popular in Germany and France. Her feast is on Aug. 13.

RADETZKY, *rá-dĭts-kĭ*, JOHANN JOSEPH WENZEL, Count of Radetz, Austrian field marshal: 1766, Nov.—1858, Jan. 5; b. Tzrebnitz, Bohemia. In 1784 he entered the Austrian milit. service as cadet in a Hungarian cavalry regt. He took part in the Austrian wars with Napoleon, brilliantly distinguished himself, and rose to the rank of lieut.field-marshal. Later, he was sent to command the Austrian army in Lombardy. Emperor Ferdinand, on his accession 1836 raised R. to the rank of field-marshal. The rebellion at last broke out suddenly in 1848, and R. was forced to retire from Milan and retreat to Verona. Only the renowned Quadrilateral (q.v.) and the citadel of Ferrara remained in the hands of the Austrians; and the revolt of Venice cut off all R.'s communications except that to the Tyrol. The Piedmontese army had effected the passage of the Mincio (May 7), and closely invested Peschiera, thus rendering R.'s position extremely critical. He had only 50,000 men to oppose to the Piedmontese army of 41,000 men around Peschiera, a corps of observation 6,000 strong near Mantua, a body of 4,000 guarding the passage of the Mincio, the Roman army of 14,000 men holding the s. bank of the Po, and an army of Venetian insurgents, numbering 15,000, in his rear. Being thus unable to take the offensive, he waited for reinforcements, which, after defeating the Venetian and Roman armies that opposed their progress, joined him at Verona May 22. The Austrians now assumed the offensive, and marched on Mantua, defeating the Italians in two bloody conflicts at Montanara and Curtatone; but were in turn signally vanquished at Goito by Charles Albert, who gained by this victory the immediate surrender of Peschiera (May 29), and rendered R.'s position more critical than ever. But the gallant Sardinian was no match for R. in generalship, for he wasted his time before Mantua, till R. had raised an army of 82,000 men, with which he drove back the king (July 22, 23), defeated him at Custozza (July 25), pursued him closely, converted his retreat into a disorderly flight, and again defeated him under the walls of Milan (Aug. 4). The king was now besieged in Milan, but (Aug. 6) a six months' armistice was agreed to, and war was not resumed by the Piedmontese till 1849, Mar. R. was this time better prepared, and at once invaded Piedmont; after a successful brush with the enemy at Vigevano (Mar. 21), he totally routed them at Novara (Mar. 23), after an obstinate conflict of six hours. Peace was then concluded with Piedmont, and R. next besieged Venice, which surrendered after a long siege (Aug. 23). He was then appointed governor-gen. of Lombardy and Venice, and ruled with absolute authority till his retirement 1857, Feb. 28. He died at Milan at the age of 91. He bore the character of a brave soldier and consummate tactician, and, strange to say, acquired all his European reputation after he had passed his 80th year.

RADFORD, *rad'ford*, WILLIAM: 1808, May 1—1890, Jan. 8; b. Fincastle, Botetourt co., Va.; naval officer. He was appointed midshipman from Mo. 1825, lieut. 1837, commander 1855, capt. 1862, com. 1863, rear-admiral 1866.

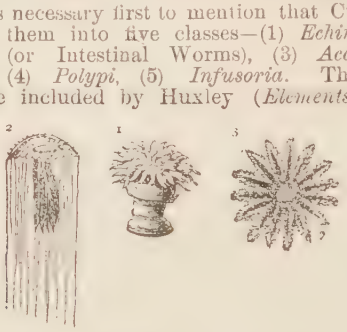
During the Mexican war he served in the Pacific squadron and commanded the company that cut out the Mexican war vessel *Malek Adhel* at Mazatlan. At the beginning of the civil war he was in command of the sloop-of-war *Dakota*, but was soon assigned to the *Cumberland*. When this frigate was attacked and sunk by the *Merrimac*, Com. R. was on court-martial duty at Old Point Comfort, and was unable to reach his vessel before the battle. As commodore, on board the *New Ironsides*, he commanded the iron-clad division of Porter's fleet, and was engaged in the two attacks on Fort Fisher, where his efficient services received highest commendation in Porter's official report. 1868–70 he commanded the European squadron; and then was assigned to duty at Washington, where he died. Except Rear-admiral Selfridge, he was the senior officer of the navy.

RADIAL, a. *rā'dĭ-ăl* [F. *radial*—from *radĭus*, a ray]: having the quality or appearance of a ray, in *anat.*, belonging or attached to the outer bone of the forearm, called the *radius*. RA'DIA'TA, n. *-ā'tă*, or RA'DIA'RIA, n. *-ā'rĭ-ă* (see below). RA'DIARY, n. *-ĕr-ĭ*, one of the radiata. RA'DIATIVE, a. *-ā-tĭv*, having a tendency to radiate.

RADIANT, a. *rā'dĭ-ănt* [F. *radiant*—from L. *radĭan'tem*, emitting beams; *radĭārĕ*, to shine—from *radĭus*, a ray]: emitting rays of light or heat; shining; sparkling; in *her.*, applied to flowers which have a ray like appearance: N. in *geom.*, a straight line proceeding from a given point or fixed pole, about which it is conceived to revolve; in *optics*, the luminous point or object from which light emanates. RA'DIANTLY, ad. *-lĭ*. RA'DIANCE, n. *-ăns* [L. *radĭans*, emitting rays], or RA'DIANCY, n. *-ăn-sĭ*, brilliant brightness; lustre; splendor. RADIANT ENERGY, the energy or power exhibited by rays of light or heat. RADIANT HEAT, the heat proceeding directly from the heated body without the intervention of media (see RADIATION, and its references).—SYN. of 'radiancy': brilliancy; glitter; splendor; glare.

RADIATA, *rā-dĭ-ā'ta:* lowest of Cuvier's four great divisions of the animal kingdom; named from the organs of sense and motion being disposed as rays round a centre: the three other great divisions in ascending order, being *Articulata*, *Mollusca*, *Vertebrata*. Before Cuvier's time all invertebrate animals were divided into *Worms* and *Insects*. In 1795 he presented a Memoir to the Nat. Hist. Soc. of Paris, in which, to use his own words, he 'marked the characters and limits of the mollusks, crustaceans, insects, worms, echinoderms, and zoophytes;' and in a Memoir read before the Institute 1812, he 'distributed these various classes under three grand divisions, each of which is comparable to that of the vertebrate animals.' The necessity for the dismemberment and rearrangement of this hetero-

geneous assemblage which Cuvier grouped together in his RADIATA, has long been felt; and at the present day, 'the radiate mob' (as Prof. Huxley terms it) may be regarded as dispersed. To show how these animals have been rearranged, it is necessary first to mention that Cuvier himself divided them into five classes—(1) *Echinodermata*, (2) *Entozoa* (or Intestinal Worms), (3) *Acalephæ* (or Sea-nettles), (4) *Polypi*, (5) *Infusoria*. The *Echinodermata* were included by Huxley (*Elements of Com-*



Radiata.

parative Anatomy, 1864) in the *Annuloida;* while J. Victor Carus (*Handbuch der Zoologie*, 1863) made them an independent group. (For a newer and complete classification, see ZOOLOGY.) The Entozoa are placed by Huxley under the *Annuloida*, and by Carus under the *Vermes*. The Acalephæ are by unanimous consent placed in the *Cœlenterata*, a primary group established by Frey and Leuckart. Of the Polypi, those with ciliated arms (the Bryozoa or Polyzoa, of which the Sea-mat or Flustra is a well-known example) are now placed among the lower mollusks, which, under the term *Molluscoida*, are considered by Huxley as one of the eight primary groups; while the remainder are placed among the *Cœlenterata*. For the Infusoria, see that title: also PROTOZOA: SUB-KINGDOMS (ANIMAL).

RADIATE, v. *rā'di-āt* [L. *radiātus*, furnished with spokes as a wheel; *radiāre*, to emit beams—from *radius*, spoke of a wheel, a beam or ray from any shining object—akin to *radix*, a root: It. *radiare*, *raggiare*, to sparkle]: to send out rays or beams, as from a centre; to shine; to fill with brightness; to proceed in direct lines from any point or surface. RA'DIATE, a., or RA DIATED, a. formed of rays; in *bot.*, arranged like rays spreading from a common centre; disposed like the spokes of a wheel; in *min.*, having crystals diverging from a common centre; in *zool.*, belonging to the radiata or rayed animals. RA'DIATING, imp.: ADJ. emitting rays. RA'DIATED, pp.: ADJ. (see above) adorned with rays. RA'DIATOR, n. *-ter*, a body from which rays proceed. RA'DIA'TION, n. *-ā'shun* [F.—L.]: emission and diffusion of rays of light or heat from a luminous or heated body; the diverging or shooting forth from a point or surface, like the diverging rays of light (see HEAT: LIGHT, and its references: SPECTRUM: DIATHERMANCY: RADIOMETER: PHOTOPHONE).

RADICAL, a. *rād'i-kăl* [F. *radical;* It. *radicale*, radical from L. *radix*, or *radicis*, a root] pertaining to or arising from the root: fundamental, implanted by nature, constitutional, original: not derived or compounded, primitive: in *bot.*, proceeding from a point close to the summit or crown of the root, applied to leaves close to the ground clustered at the base of a flower stalk, complete, thorough N. a root: in *chem.*, the base or distinguishing part of a compound, whether itself a simple or compound (see below): a primitive or uncompounded word: or later a politician who advocates extreme democratic changes in the state. RAD'ICALLY, ad. -*i-kăl-li*. RAD'ICALNESS, n. -*kăl-nĕs*, the state or quality of being fundamental. RAD'ICALISM, n. -*izm*, the principles or doctrines of the radicals. RADICAL QUANTITY, in *alg.*, the quantity before which the sign of the root is placed. RADICAL SIGN, in *alg.*, the sign √ placed before a quantity to indicate the root to be extracted.—SYN. of 'radical, a.': fundamental, underived, primitive, original, natural; entire, complete, thoroughgoing, unsparing; extreme.

RAD'ICAL, in Chemistry, a group of elements common to a series of allied compounds, and unaffected by the processes whereby these compounds are transformed: such a group of elements is C_6H_5 (phenyl), the radical of common alcohol C_2H_5O (C_2H_5OH). Thus, ammonia, NH_3, in which the nitrogen is trivalent, yields, on removal of one atom of hydrogen, the univalent radical NH_2 (amidogen), which, with one atom of potassium, forms NH_2K (potassamide); abstraction of 2 hydrogen atoms from the molecule NH_3 leaves the bivalent radical NH (imidogen), which with 2 methyl atoms forms $NH(CH_3)_2$ (dimethylamine); abstraction of all three hydrogen atoms from NH_3 leaves only N, nitrogen, which frequently acts as a trivalent radical, forming $N(CH_3)_3$ (trimethylamine). Again, OH_2, the molecule of water, by losing an atom of hydrogen, becomes the radical OH (hydroxyl), which, in its relations to other bodies, is analogous to chlorine, bromine, and iodine, and in combination may be substituted for one atom of hydrogen and other monad elements.

RADICANT, a. *rād'i-kănt* [F. *radicant*, radicant—from mid. L. *radicans-tem*, taking root; *radicor*, I take root—from *radix*, a root] in *bot.*, taking root on or above the ground; producing roots from the stem.

RADICATE, v. *rād'i-kāt* [mid. L. *radicātus*, taken root—from L. *radix*, a root]: to plant deeply and firmly, to root: ADJ. possessing roots; deeply planted; fixed firmly, as by root. RAD'ICATING, imp. RAD'ICATED, pp. RADICATION, n. -*kā'shŭn*, the process of taking root and fixing deep; in *bot.*, the general disposition and arrangement of the roots of a plant.

RADICLE, n. *rād'i-kl* [F. *radicule*—from L. *radic'ŭlă*, a little root—from *radix*, a root]: in *bot.*, the part of the embryo in the seeds of plants which becomes the root; the small roots of plants, or the fibres about the top roots. RADICULAR, a. *răd-ĭk'ū-lĕr*, of or pertaining to the radicle.

rr, Radicle; *cc*, cotyledons.

RADIO-, prefix, *rā'dĭ-ō* [L. *radius*]: in *anat.*, pertaining to, or connected with the radius; in *zool.*, radiate.

RADIOGRAPH, n. *rā'dĭ-ō-grăf'*: a sunshine-recorder; an actinograph. Among various names suggested for pictures taken by the Röntgen process are radiographs and radiotypes.

RADIOLITES, n. plu. *rā'dĭ-ō-līts* [L. *radĭŭs*, a ray: Gr. *lithos*, a stone]: in *geol.*, genus of cretaceous bivalves named from the radiated structure of the outer layer of their opercular looking upper valves. They are found only in cretaceous rocks, and are remarkable for the great diversity of the valves: the upper valve is flat or conical, with a central umbo; and the lower is an elongated cone. RA'DIOLA'RIA, n. plu. *-lā'rĭ-ă*, a division of the Protozoa—with Rhizopoda, Foraminifera, Infusoria: see also ZOOLOGY. They are minute organisms, generally inclosed in a siliceous shell.

Radiometer.

RADIOMETER, n. *rā'dĭ-ŏm'ĕ-tĕr* [L. *radĭŭs*, a ray; Gr. *metron*, a measure]: instrument which revolves in a vacuum, under the influence of light, with varying rapidity—intended to exhibit the energy of rays of light. It has been adapted as a photometer; called by the Germans a light-mill. It consists of 4 very slender crossed arms of glass supported at their centre on a needle-point, and bearing on their extremities small light disks of pith or of mica blackened on one surface, and with the blackened surfaces all facing in one direction: it is inclosed within a glass bulb from which the air is exhausted by a Sprengel pump. When the disks are exposed to light or heat, revolution of the 'light-mill' begins immediately, and its speed is proportioned to the intensity of the light to which they are exposed. Two candles produce twice the effect of one, and the flame of magnesium wire makes the disks turn round with great rapidity. In ordinary circumstances the dark faces are apparently repelled. The theory of the motion of the vanes is, that it is really a thermal phenomenon: under the action of the radiant energy directed in upon them, the dark faces, absorbing more energy, become warmer than the bright faces: hence an inequality of temperature is produced in the highly rarefied gas, and this brings into existence a stress which propels the vanes. It was invented by Wm. Crookes, 1875.

RADIOPHONE, n. *rā'dĭ-ō-fōn* [L. *radius*, ray: Gr. *phonē*, voice]: apparatus for producing sound by the action of reflected light rays or heat rays: essentially the same as the PHOTOPHONE (q.v.). RADIOPH'ONY, n. performance of a radiophone.

RADISH, n. *răd'ish* [AS. *rædic;* F. *radis;* It. *radice*, Ger. *rettig*, a radish: L. *radix* or *radicem*, a root], (*Raphănus*): genus of plants, of nat. order *Crucĭfĕræ*, having a spongy Silique (q.v.). The flowers are yellow, red, or purple.—The COMMON R. (*R. sativus*) has thick, round, tapering, and pointed pods, little longer than their stalks, very slightly contracted, and not falling to pieces. It is an annual, with branching stem two to four ft. high, rough lyre-shaped leaves, and white or pale violet-colored flowers with dark veins. It is a native of Asia, from the coasts of the Mediterranean to Japan, and has been cultivated in China, India, and Europe from most ancient times, for its fleshy roots, which have a sharp biting taste, and are much used when young as a salad, also to some extent as a boiled vegetable. There are two classes, the long-rooted and the turnip-rooted R.; the roots of the former resembling the carrot in shape, and the latter the turnip. The varieties, of which there are more than 80 grown in this country, differ very much, not only in form of root, but also in color and size. The R. thrives best in light, dry, and rich land. On wet and heavy soils, and where it makes slow growth, it is of poor quality. For early use, plants may be started in a hot-bed in Feb. To secure a succession the seed should be sown at intervals of two weeks from the time when the ground can be worked in spring till Sep. Rows should be 8 to 12 in. apart, and the plants thinned to two in. in the row. As soon as the plants appear they should be dusted with air-slacked lime to prevent injury by the fly. Seed of winter varieties is to be sown in Aug. The plants should be taken up before the ground freezes, removed to a cool cellar, and covered with earth. The roots are washed and the plants tied in bunches before being sent to market. The root of the R. possesses demulcent, stimulant, and diuretic properties, and is used sometimes in cases of atony, or of excessive secretion of mucus by the organs of digestion or the urinary organs. R. juice, mixed with sugar-candy, is a popular and useful German remedy for hoarseness and cough.—Distinct from both the varieties above-named is the OIL R., which has a slender—scarcely fleshy—root, a short much-branched stem, and many-seeded pods. It is cultivated in China for the oil of its seeds.—Another species of R. (*R. caudatus*), native of Japan, is there cultivated as an esculent.—To this genus belongs the JOINTED CHARLOCK (*R. raphanistrum*), which has found its way from Europe to N. America, and is a troublesome weed. The seeds, however, may be advantageously crushed for oil.—The SEA R. (*R. maritimus*) is a more rare British species, the roots of which are of fine quality and great pungency. HORSE-RADISH is the *Cochlĕărĭă armorăcĭă*, or *Armorăcĭa rusticănă*, ord. *Crucifĕræ*, and has irritant and vesicant qualities.

RADIUS, n. *rā'di-ŭs*, plu. RADII, *rā'di-ī* [L. *radĭŭs*, the spoke of a wheel, a ray]: in *geom.*, a straight line drawn or extending from the centre of a circle to its circumference: see CIRCLE: QUADRATURE. R. is also the spoke of a wheel: in *anat.*, the exterior or smaller bone of the forearm, reaching from the elbow to the wrist, above the thumb: in *bot.*, the ray or outer part of the heads of composite flowers. RADIUS VECTOR, n. *věk'tŏr* [L. *vector*, a bearer or carrier]: in *astron.*, an ideal straight line drawn to any body moving in an orbit from a fixed point considered as the centre of the motion, as a line joining a planet to the sun as its centre. RADIUS RODS, in a *steam-engine*, the guiding-rods in a parallel motion to counteract the vibratory motion communicated by the beam.—*Radius* in *trigon.*, is taken as unity, and the sines, cosines, etc., are expressed in terms of it. In astronomy, the same term is employed in a slightly different sense; and to prevent confusion, it is changed into *radius vector*. The radius vector is a straight line drawn from the centre of force to the position of a body which describes its orbit round that centre; if the orbit is a circle, the radius vector is invariable in its length, but constantly changes if the orbit be any of the other conic sections. From astronomy the term radius vector has been transferred to what are called *polar equations* in the higher mathematics. To express a curve by this method, a point is taken for the *pole;* through this point a line, the *axis*, is drawn, indefinite in length and arbitrary in direction; then as one end of the radius vector is at the pole, its inclination to the axis, and its length at this inclination, will give a point in the curve. Equations to curves, when thus expressed in terms of the radius vector, and its inclination to the axis, are called *polar co-ordinates*, and are generally much simpler in form than when expressed by rectangular *Co-ordinates* (q.v.).

CA, CD, CB, CE, Radii.

RADIX, n. *rā'dĭks* [L. *radix*, a root: Gr. *rhadix*, the branch of a tree: probably akin to Skr. *rādh*, to grow, to arise]: in *arith.* and *math.*, the base of any system of computation, as of logarithms; in *bot.*, the part of a plant situated in the ground, by which the plant is fixed, and through which it derives its nourishment; the root; a primitive word; origin.

RADNOR, *răd'nĕr*, NEW: municipal borough in Radnorshire, Wales; in the midst of exceedingly wild and hilly scenery, on the s. border of Radnor Forest, 8 m. w.s.w. of Presteigne. In the immediate vicinity is the cascade *Water-break-its-neck*, 70 ft. in height, one of the most notable in Wales. New R., formerly of some importance, has dwindled into a small country town, remarkable only for its surrounding scenery. Pop. (1881) 3,267.

RADNORSHIRE, *răd'nĕr-shēr:* inland county of S. Wales, bounded n. by Montgomeryshire and Shropshire, s. and s.e. by Brecknock and Hereford; 276,552 acres. Groups of mountains, seldom forming continuous chains,

cover the greater part of the surface. Radnor Forest, whose highest point is 2,163 ft., runs e. and w., and is the loftiest and most connected of the ranges. The s.e. dist. is flat, with gradual eastward slope. Of the rivers, the chief of which flow southward, the principal is the Wye (which forms the greater part of the s. boundary), and its tributaries the Ithon, the Elan, and the Lugg. The county formerly comprised large tracts of bog and moorland, which are being gradually reclaimed and cultivated. Its valleys, especially that watered by the Lugg, are famed for the richness of their pastures, which feed splendid herds of 'Herefords.' In the e. and s.e. districts excellent wheat, barley, oats, and potatoes are grown. Though rather more than half the county is cultivated, yet of this less than a third is under the plow, fully two-thirds being in permanent pasture, chiefly for sheep. Pop. (1871) 25,430; (1881) 23,539; (1891) 21,791.

RADOM, *rä'dŏm:* government in the kingdom of Poland (q.v.), s. of the govt. of Warsaw; 4,755 sq. m. The surface, partly traversed by the Sandomir Mountains, which rise in the Katherinenberge above 2,000 ft., is the most elevated in the kingdom. The principal rivers are the Pilica and the Vistula, both flowing north. The soil is diversified. Pop. (1880) 613,086; (1890) 782,274.

RA'DOM: town, cap. of the govt. of R., on the Radomka, 60 m. s. of Warsaw. It has grown in recent years, and is the seat of active trade and commerce. Pop. (1880) 12,061.

RADOWITZ, *rä'do-vĭts*, JOSEPH VON: Prussian general and statesman: 1797, Feb. 6—1853, Dec. 25; b. Blankenburg; son of a nobleman of Hungarian descent. He received his professional education at Paris, and in the Military School of the kingdom of Westphalia, and 1813 he entered the Westphalian army as an officer. In 1823 he entered the Prussian service, and 1830 became chief of the general staff of artillery. By his marriage with Countess Maria v. Voss (1828), he became connected with the Prussian aristocracy, and soon became the leader of the anti-revolutionary party. In 1836 R. was sent as Prussian military commissioner plenipotentiary to the German diet at Frankfurt, and filled other diplomatic posts; and 1845 he was raised to the rank of major-general. His influence on public affairs in Germany became more and more conspicuous; he was the confidant and adviser of King Frederick-William IV. in his endeavors to reform the German diet. The revolution of 1848 opened to R. a new field. The endeavors of Prussia to give a constitution to Germany, by means of the alliance of the three kings, was principally his work; but the scheme failed. In 1850 he became sec. for foreign affairs; but 1851 retired to Erfurt, where he wrote *Neu Gespräche* (1851). He wrote several mathematical works; and one on the Spanish War of Succession. See lives by Frensdorff and Fischer.

RAEBURN, *rā'bern*, Sir HENRY, R.A.: Scotch portrait-painter: 1756, Mar. 4—1823, July 8; b. Stockbridge, then a village near Edinburgh, where his father was a manufacturer. His parents died when he was little more than six years old, and he was educated in George Heriot's Hospital, and apprenticed to a goldsmith and jeweller when about 15 years of age; but in his leisure practiced miniature-painting with such success, that he was soon enabled to buy up his indenture, and apply himself first to miniature, and then to portrait-painting in oil. He went to London, where he was kindly received by Sir Joshua Reynolds, who soon perceived the talent of the young artist, and offered him funds to visit Rome. R. set out, furnished with letters to artists of note in Rome at the time. After two years in Italy, he settled in Edinburgh, 1787. In 1812 R. was elected pres. of the Soc. of Artists in Edinburgh; 1814, associate of the Royal Acad. of London; 1815, academician. He was knighted 1822. He died at Edinburgh. R.'s style was modelled on that of Reynolds; he aimed, like him, in his pictures to produce breadth, which is the effect obtained by massing together and keeping as far as possible the lights distinct from the shadows, and making them respectively effective, in place of dividing and mingling them all over the picture; but he developed this principle in a manner and with a feeling peculiarly his own. He never attempted, by thick impasto and semi-transparent painting, to produce texture and luminous effect, but adopted the opposite mode of painting in low tone with sharp touch, working his colors with little unctuous admixture. In his portraits of men, in particular, he gives the characteristic expression in a simple but decided and effective manner. His style has been thought by connoisseurs to resemble in many respects that of Velasquez. R.'s reputation, which was very high in his lifetime, is still rising, his pictures being now much sought after. Many notable personages sat to R. for portraits.

RAFF, n. *rĭf* [It. *raffola-ruffola*, a scrambling crowd, riff raff: Ger. *raffen*, to sweep]: those who talk idly and coarsely; the sweepings of society; the rabble, used chiefly as a compound, *rĭff-raff*: V. in *OE.*, to sweep: to huddle together.

RAFFAEL'LE: see RAPHAEL.

RAFFAELLE-WARE, n. *răf fā-ĕl-wār*: fine kind of majolica ware, which took its name from the improbable supposition that the designs were painted by Raphael. The designs were probably from original drawings by Raphael. They are scenes from anc. mythology, or other fanciful subjects.

RAFFLE, n. *răf fl* [It. *raffolare*, to rake or scrape together: F. *rafler*, to scrape or scratch away: Icel. *hrafla*; Ger. *raffen*, to sweep]: a petty kind of lottery decided by casting dice and by other means, the winner taking the article or articles put up: V. to cast dice for a prize or stake. RAF'FLING, imp. RAF'FLED, pp. *-fld*. RAF'FLER, n. *-flĕr*, one who raffles.

RAFFLES, *răf'flz*, THOMAS, D.D., LL.D.: English Congl. minister: 1788–1863; b. London; son of a solicitor. He entered Old Coll., Homerton, near London; completed his course of study 1809; was minister of the Independent Chaple at Hammersmith three years, and of St. George's Chapel, Liverpool, till 1861. His eloquence attracted many hearers, both residents and strangers. A vol. of poems was published by him, conjointly with Dr. J. H. Brown, and J. H. Wiffin, translator of Tasso. He also published *Memoir of Rev. T[illegible] Spencer*; *Letters during a Tour through Some Parts of France, Savoy, Switzerland, Germany, and the Netherlands*; two vols. of lectures on religious subjects, and many sermons.

RAFFLES, Sir THOMAS STAMFORD: traveller and naturalist: 1781, July 5—1826, July 5; b. at sea off Port Morant in Jamaica; son of a capt. in the W. India trade. He became a clerk in the E. India House at 14; 1805 was appointed assist. sec. of the E. India Company's establishment at Prince of Wales Island. Eventually, R. was made principal secretary. He made good progress in Malay and other eastern languages. In 1811 the English govt. sent an expedition to take possession of Java, then belonging to the Dutch, and R. went as sec. to the gov.gen., Lord Minto, who was to take chief command. After the troops took possession of the island, R. was made lieut.gov. of Java and its dependencies; and on departure of Lord Minto took the entire administration. He appointed British residents at native courts, framed rules for their conduct, ordered a general survey of the whole island, and sought to become acquainted with the manners and character of the natives. His health gave way, and in 1816 he returned to England, where he wrote his well known *History of Java* (2 vols. 4to, 1817), and received the honor of knighthood. Java having been restored to the Dutch, Sir Stamford R. was appointed lieut.gov. of various Eng. settlements in the East, till in 1824 ill-health compelled his return to England. The vessel in which he set sail was burned, and he lost the greatest part of his effects, including a fine collection of nat. history, etc., valued at about £20,000. After his arrival in England, he formed and became pres. of the Zoological Soc. of London.

RAFFLESIA, *răf flē'zhe-a*: remarkable genus of plants belonging to the small nat. order *Rafflesiacea* (entirely parasitic plants, consisting merely of a flower), and forming part of the *Rhizogens* (q.v.) of Lindley. The *Rafflesiacea* are natives partly of the Indian islands and partly of S. America. The plants of the genus *Rafflesia* have neither stalk nor leaves, but are mere flowers seated upon the roots of species of *Cissus*, making their appearance at first as a hemispherical swelling of the bark of the root, and, after the bark has broken, rising up in the form of a head of cabbage, while the perianth is covered with imbricated bracteæ, which are more or less recurved after it has opened. The perianth is thick, fleshy, and 5-partite. The germen is inferior, and contains many ovules; and the numerous anthers are seated under the revolute margin of

the top of the style column. After the flower has expanded, it diffuses a carrion-like smell, that even attracts flies, and induces them to deposit their eggs. The largest and first-discovered species, *R. Arnoldi*, was discovered 1818 in Sumatra by Dr. Arnold. Its flower measures fully three ft. in diameter, is capable of containing almost two gallons of fluid, sometimes weighs ten lbs. and is the largest of all known flowers. A smaller species, *R. patma*, whose flowers are 16 to 24 inches in diameter, is prized by the Javanese as a medicine, for its strong styptic powers.

Rafflesia Arnoldi.

RAFN, *räfn*, KARL CHRISTIAN: Danish critic and archæologist: 1796, Jan. 16—1864, Oct. 20; b. Brahesborg, in the island of Fünen. He was educated at the Univ. of Copenhagen. Becoming sub-librarian of the univ., he undertook a general revision of all the Icelandic and Old Norse MSS. preserved there. As sec. of the Soc. for Northern Antiquities, R. edited and published about 70 vols. of anc. Scandinavian MSS., many of much interest and importance. But his most famous and perhaps most interesting work is *Antiquitates Americanæ, seu Scriptores Septentrionales Rerum Ante-Columbianarum in America* (Copenh. 1837), in which, from critical examination of numerous geographical, nautical, and astronomical data in certain Old Norse MSS., he comes to the conclusion that America was discovered by Norsemen in the 10th c., 400 years before Columbus was born; and that from the 11th to the 14th c. a large tract of the N. Amer. coast had been visited and even partially colonized as far s. as R. I. and Mass.—a conclusion whose probability has been strengthened in several important points by recent topographico-antiquarian researches in those states. The subject was followed up by him and Finn Magnussen in their *Historical Monuments of Greenland* (3 vols. Copenh. 1838–45). R. had a great share in editing the Icelandic MSS. relating to the history of Russia and other eastern countries, of which two vols. appeared at Copenhagen 1850–52, under the title *Antiquités Russes*. R. died at Copenhagen.

RAFT, n. *râft* [Icel. *raptr*, a pole, a stake; *raf*, a roof: Dan. *raft*, a spar, a pole: Fris. *rafte*, a lath: Bav. *rafen*, the roof spar], a number of pieces of timber, logs, or planks fastened together for floating on water; prepared timber fastened together and floated down a stream to a certain point: *V.* to carry on or in a raft. RAF'TING, imp. RAF'TED, pp. RAF'TER, n. *-tėr*, one of the inclined or sloping beams in the side of a roof, supporting the roof-covering and meeting in an angle at the ridge—on the rafters rests the boarding on which are the tiles or shingles. RAF'TERED, a. *-terd*, furnished with rafters. RAFTSMAN, n. *râft's man*, one who manages a raft floating down a river.

RAG, n. *rag* [sw. *ragg*, long coarse hair, as of goats: Dan. *rage*, to project: Icel *ragg*, shagginess: Lith. *ragas*, a horn, tooth of a wheel: Gael *rag*, a rag, a wrinkle: AS. *raggè*, rough]: a piece of cloth torn or rent from the rest; a tatter; a fragment; cloth or dress very much worn; in *OE*, a person of low degree, a vulgar person: PLU. garments much worn, appared tattered and torn. RAGGED, a. *ragged*, rent or worn into rags, dressed in tattered clothes; having a rough fracture; rough; uneven; rugged; intended for the very poor, as a school (see RAGGED SCHOOLS); in *her.*, irregularly indented (see RAGGLED). RAG'GEDLY, ad. *li*. RAG'GEDNESS, n. *-nes*, state of being dressed in torn or tattered clothes. RAGAMUFFIN, n. *rag'a-muf'fin* [Eng. *rag*, and prov. Ger. *muffen*, to smell musty]: a low disreputable person; a blackguard. RAGBOLTS, iron pins having jags or barbs on both sides. RAGGED-ROBIN, the *Lychnis flos-cuculi*, or flower of the cuckoo, a wild plant with a pretty pink flower, ord. *Silenaceæ*. RAG MAN, one who collects or deals in rags. RAG'STONE, a prov. Eng. term for any hard coarse-textured rock, as *Kentish rag*, much used for building purposes. RAG-TAG, the scum of the population. RAG-WHEEL, in a *machine*, a wheel having a notched margin.

RAGATZ, or RAGAZ, *rä-gäts'*: watering-place in Switzerland, canton St. Gall, about 30 m. s.e. of the town of St. Gall, 60 m. s.e. of Zurich. It is on an elevation of 1,700 ft., at the mouth of the gorge through which the Tamina pours into the Rhine. The hot springs of Pfäffers, 2½ m. higher up the ravine, supply water for the baths. R. is in one of the most picturesque portions of Switzerland, and is annually visited by thousands of tourists as well as by those drawn by the curative properties of its hot springs. It contains the grave of Schilling, who died here 1854; and it is noted for the defeat of the Austrians by the Swiss 1446.—Pop. resident (1870) 1,825; (1880) 1,996.

RAGE, n. *rāj* [F. *rage*, rage. Sp. *rabia*—from L. *rabĭes*, fury; *rabo*, I rave: It. *rabbia*; Sic. *raggia*, rage. Dut. *rabbelen*, to gabble: Ger. *rappeln*, to rattle]: fury; anger excited to fury; anger expressed in wild excited words and gestures; an unsupportable increase of anything painful; extreme violence; extreme eagerness or passion directed toward some object, enthusiasm, as applied to a fashion:

V. to be furious with anger; to be violent and tumultuous; to ravage; to continue with unchecked fury or fatal effect, as a storm or a pestilence; to be violently agitated, as the sea; to move furiously. RAG'ING, imp.: ADJ. acting with violence or fury; violent; impetuous; vehement: N. fury; impetuosity; violence. RAGED, pp. *rājd.* RAG INGLY, ad. *-li.*—SYN. of 'rage, n.': wrath; anger; choler; ire; vehemence, eagerness; excitement; passion; fury;—of 'rage, v.': to storm; chafe; fret; fume; ravage.

RAGG, n. *răg:* another spelling for RAG or RAGSTONE: see RAG.

RAGGED, etc.: see under RAG.

RAG'GED SCHOOLS: institutions well-known in England, which, as distinct from the Certified Industrial Schools, are a voluntary agency providing education for destitute children, and so preventing them from falling into vagrancy and crime. Vagrant children, and those guilty of slight offenses, are provided for in the Certified Industrial School; but the two institutions are frequently combined: see INDUSTRIAL SCHOOLS. The movement which established ragged schools in England was almost simultaneous with that which instituted reformatories. John Pounds, a poor shoemaker at Portsmouth, has the honor of originating the idea. For 20 years, till his death 1839, he gathered the ragged children of the district round him as he sat at work. They came freely, and were taught gratuitously. The success of his humble efforts soon led many influential friends of the 'outcasts' to engage in the same work. In 1838 London had a Ragged Sunday School, which eventually became a free day-school. Field Lane followed in 1843. But the first ragged feeding-school was opened 1841 by Sheriff Watson, Aberdeen. In 1845 Dr Robertson, not then aware of the existence of Sheriff Watson's, opened a similar school in the Vennel, Edinburgh. Soon afterward Dr Guthrie's famous *Plea for Ragged Schools* appeared, a work which gave irresistible impetus to the movement. After this, ragged schools spread over all the land, until there was scarcely an important town that had not one or more. The Education Acts, however (1870,72), introduced the principle of compulsory attendance at school; under this provision, many of such as were merely free day-schools have become public schools. But as the Education Acts make no provision for feeding the children, the managers of feeding-schools continue their efforts. In places where the system has been efficiently conducted, juvenile crime has sensibly diminished, according to the testimony of prison officials. The ragged schools do not (since 1859) receive govt. aid.

RAGGEE, *răg'ē* (*Eleusine corocana*): Indian grain (see ELEUSINE), very prolific, but perhaps the least nutritious of the cereals, though this poor fare is the chief food of the poorer classes in Mysore and on the Neilgherries. It is made into dark-brown cakes and porridge.

RAGHU, *rāg'ū:* in the legendary history of anc. India, king of Ayodhyā. See OUDE. He belonged to the royal dynasty which derived its origin from the sun; and among his descendants is Rāma (q.v.). See RAGHUVANSA.

RAGHUVANSA, *rag-ū-vin si* [from *Raghu* (q.v.) and *vans'a*, race or family, hence 'the family of Raghu']: title of one of the most celebrated poems of Sanskrit literature, attributed to the authorship of Kālidāsa (q.v.). It consists of 19 sargas—i.e., sections or cantos—and deals with the legendary history of the kings of the solar race, beginning with Dilipa, father of Raghu, and ending with Agnivarna. The text of the poem, with excellent Latin translation, was published by Prof. A. F. Stenzler (London 1832); the text, with prose interpretation in Sanskrit, by Pandits of the Sanskrit College of Calcutta (1831); and the text, with the important commentary of Mallināth a, by one of the professors of the govt. Sanskrit College (Calcutta 1852).

RAGLAN, n. *rāg'lan* [after Lord *Raglan*]: a kind of loose overcoat, with very loose sleeves.

RAGLAN, *rāg'lan*, Lord (FITZROY JAMES HENRY SOMERSET): field-marshal, G.C.B.: 1788, Sep. 30—1855, June 28; 8th son of the 5th Duke of Beaufort. He entered the Brit. army in his 16th year. He went to the Peninsula as aide-de-camp to the Duke of Wellington, and 1812 became his milit. sec. As Lord Fitzroy Somerset, he gained great popular repute; was in all the great actions of the Peninsular campaign, and was among the first to mount the breach at the storming of Badajoz. On the return of Napoleon from Elba, he served under the Duke in Flanders, and lost his sword-arm at Waterloo. The next day, he was seen practicing writing with his left hand. He was made K.C.B., and received decorations from several foreign potentates. He was minister-plenipotentiary at Paris 1815. After filling various important milit. positions, he was made master-gen. of the ordnance 1852, and in Oct. was called to the house of peers as Baron Raglan of Raglan, in the county of Monmouth. He had previously (1818 and 26) sat in the lower house. He was appointed commander of the English forces sent to Turkey 1854, Feb. The allied armies of Britain and France, under R. and Marshal St. Arnaud respectively, made good their landing in the Crimea. Then followed the victory of the Alma, the flank march to Balaklava (q.v.), the cavalry charge which has made that place immortal, the sanguinary and desperate infantry-battle of Inkermann (q.v.) (which obtained for R. the baton of field-marshal), and the siege of Sebastopol. The fearful privations of R.'s army in the winter of 1854–5, the perishing of hundreds in camp and on board transports for lack of the food, clothing, and medicines which were in store, but could not be found in the confusion and mismanagement that prevailed, caused unfavorable comments on R.'s conduct of the war; which were increased when, June 18, in a general assault by both armies on the Russian works, both received a ter-

rible repulse. R. had been suffering from a slight attack of cholera, and the disaster weighing on his mind, he suddenly became worse, and died of exhaustion. His remains were taken to England, and buried in the family cemetery at Badminton. R. was a skilful tactician, though it may be doubted whether he had the qualities of a great general. He was undeniably gifted with many qualities that shone brilliantly in the field. His demeanor in action was wonderfully calm. He had a courteous and noble bearing, with great gentleness of temper and firmness of mind, and chivalrous worship of 'duty.' See Kinglake's *Invasion of the Crimea.*

RAGMAN ROLLS, n. *răg'măn rōlz* [from *ragman*, and *roll*]: collection of deeds, of 35 separate parchments, dating from the 13th c., signed by the nobility and gentlemen of Scotland under coercion of Edward I. of England after he had overrun the country 1296, in which they acknowledge their allegiance to him as sovereign. The original instruments of homage have almost entirely perished; but the roll in existence in the Tower preserves a record of them: its contents were printed by the Bannatyne Club 1834. An especial value attaches to the Ragman Roll as containing the largest and most authentic enumeration extant of the nobility, barons, landholders, and burgesses, as well as of the clergy of Scotland, prior to the 14th c., and the only genuine statistical notices of Scotland of the period. *Note.*—In *OE.*, *ragman* or *rage-man* was used in the sense of 'the devil'—quite accurate as descriptive of the popular ideas attached to the character and doings of King Edward I: later, *ragman* meant a legal document: see Mackay and Halliwell.

RAGNARÖK, n. *răg'nă-rōk* [twilight of the gods]: in *Scand. myth.*, the day of doom, when the present world with all its inhabitants will be annihilated, to be reconstructed on an imperishable basis.

RAGOUT, n. *rā-gō* [F. *ragoût*, a ragout—from *ragoûter*, to restore the appetite—from L. *re*, again; *gustus*, a tasting]: sauce or seasoning for exciting a languid appetite, also a name formerly much in use for a dish of stewed meat and vegetables, usually strongly flavored with herbs and other condiments, and differing little from the olla of the Spaniards and the pilau of the Turks.

RAGS: see RAG TRADE.

RAG'STONE: impure limestone, consisting chiefly of lime and silica. It breaks up into pieces about the size of a brick, and is hard and flat bedded. The name is applied also to the hard irregular rock which frequently overlies better building materials. Besides being used for building purposes, hones or sharpening stones for scythes and other large blades are made of it.

RAG TRADE: trade in such rags as are used in manufacture. Woolen rags, formerly allowed to rot on the refuse-heap, are now consumed, under the name of 'shoddy,' to a vast extent in manufacture of cheap woolen cloths. See SHODDY.

Linen and cotton rags are nearly all consumed in manufacture of paper; but of late years the demand for paper has so greatly increased that rags are no longer its principal raw material. It is stated that for years rags have been used alone for the paper only of bank-notes, ledgers, and similar special purposes, esparto fibre being even preferred as a material for printing-paper. Wood pulp has come into very extensive use to mix with rags for all kinds of papers, forming often as much as 70 per cent. of their weight.

There is reason to fear that the regular supply of esparto, as the staple material for paper, cannot be depended on; and even though it could, rags will always be of great value for the better kinds. The consumption of rags per head of the pop. in various countries differs largely. In an average year, 1870–80, the consumption was thus estimated: In Russia, 1 lb. per head of the pop.; Spain, 1½ lb.; Mexico and Central America, 2 lbs.; Italy and Austria, 5 lbs.; France, 7 lbs.; Germany, 8 lbs.; United States, 10¼ lbs.; and Britain, 11½ lbs. Most of the imported linen rags have come from Germany and France. Cotton, flax, and jute waste from spinning-mills all are used for paper-making.

RAGULED, a. *rā-gūld*, or RAGGED, a *rāg'ĕd* [F. *ragué*, fretted, as a rope by rubbing, cut in pieces]: in *her.*, applied to a cross whose limbs are deeply jagged or indented irregularly. RAGULY, an ordinary whose bounding lines are furnished with serrated projections.

RAGU'SA: old town in s. Sicily, province of Syracuse, 30 m. w.s.w. of the city of Syracuse, on a narrow and steep ridge between two ravines, on the right bank of the Ragusa, about 15 m. from the sea. There are manufactures of cotton, woolen, and silk goods. In the cliffs below the walls and around the town, ancient tombs of various shapes have been hollowed out. R. is supposed to occupy the site of the ancient *Hyda Minor*. Pop. (1882) 21,194.

RAGUSA, *rā-gū'sā* (Slav. *Dubrovnik*, Turk. *Paprovnik*): formerly an independent republic, now a decayed episcopal town and seaport of Austria, in the crownland of Dalmatia: at the base and on the steep slopes of Mt. Sergio, 40 m. w.n.w. of Cattaro. Its higher streets communicate with its lower by flights of steps. It is surrounded on the land side by double walls surmounted by old towers. Immediately s. of the town is a harbor which admits only small vessels; but two m. w. is Gravosa, the proper harbor of R., with secure and spacious accommodation for the largest vessels. The trade of R. has greatly declined, and its inhabitants number about a sixth of the former population. They manufacture and export oil (very excellent), soap, liquors, malmsey wine, silk, leather, and tobacco. The word *argosy* (1589) is probably derived from *ragosie* or *ragusye* (1577), a Ragusan ship—an interesting etymology, indicating the ancient mercantile importance of the republic.

R. is supposed to have been founded 656 by refugees

from Old R. (anc. *Epidaurus*, 10 m. s.e.), which was at that time destroyed by a tribe of Slavonians. It formed itself, after the model of Venice, into an aristocratic republic, governed by a rector. In 1358 it placed itself under the protection of Hungary, and later it became tributary to the Porte. Napoleon 1808 abolished the republican govt. of R., and incorporated the town with the province of Dalmatia. After 1814, the town and province came into the possession of Austria.—Pop. (1891) 7,143.

RAGWORK, n. *răg'wĕrk:* in *masonry*, wall laid with undressed flat stones, about the thickness of a brick, and leaving a rough exterior, whence the name.

RAG'WORT: common English name of those species of *Senecio* (q.v.) in which the heads of flowers have a

Common Ragwort (*Senecio Jacobæa*).

spreading ray, the involucre has small scales at the base, and the leaves are pinnatifid. The Common Groundsel (*S. vulgaris*), the cultivated Tassel Flower (*S. sonchifolia*), and the miscalled German Ivy, from the Cape of Good Hope (*S. scandens*) have no ray petals.

Our common native species is Golden R. or Squaw Weed (*S. aureus*), cottony when young, becoming smooth, 1–3 ft. high, with an umbel-like cluster of yellow flowers. But terweed (*S. lobatus*) belongs to the same genus; also, according to some authors, the beautiful Cinerarias (q.v.). Purple R. (*S. elegans*) is from the Cape of Good Hope. The common R. (*S. Jacobæa*), perennial, is too plentiful in many pastures of Europe. It is refused or disliked by horses, oxen, and sheep. It generally disappears from thoroughly drained land, at least after a little labor in grubbing up its roots. The fresh herbage has been used to dye wool green, but the color is not permanent.

RAHDUNPUR, *rá-dun-púr:* large fortified town of Hindustan, in the protected state of R., in the n.w. of Guzerat, about 150 m. n.w. of Baroda. The majority of the inhabitants, who are chiefly Rajputs and Coolies, are engaged in agriculture; there are manufactures and trade however. Coarse cotton cloths—the staple manufacture—and grain, leather, and hides are exported. Pop. 15,000.—The *state* of R., under British protection, has 850 sq. m. The climate, very hot during Oct. and Nov., is delightful from Dec. to April. Pop. of state 91,500.

RÂHU, *rá'hoo:* in *Indian mythology*, the demon imagined to be the cause of the eclipses of sun and moon. When, in consequence of the churning of the milk-sea, the gods had obtained the Amr'ita, or beverage of immortality, they succeeded after a long struggle with their rivals, the Daityas, or demons, in appropriating it to their own exclusive use, when R., one of the demons, insinuating himself among the gods, obtained a portion of the Amr'ita. Being detected by the sun and moon, his head was cut off by Vishn'u; but the Amr'ita having reached his throat, his head had already become immortal, and in revenge against sun and moon, the head pursues them with implacable hatred, seizing them at intervals, thus causing their eclipses. Such is the substance of the legend in the *Mahâbharata* (q.v.). In the *Purán'as* (q.v.), the legend is amplified.

RAHWAY, *raw'wā:* city in Union co., N. J.; on the Rahway river and on the Pennsylvania railroad; 20 m. s.w. of New York. The river, navigable for vessels of light draught to R., affords direct water communication with New York. The city is laid out attractively; has water, gas, and electric light service, and contains high school, 4 grammar schools, 2 private schools, opera house, public library, several secret society halls, 10 churches, 1 state bank (cap. $50,000), 1 savings bank, and 2 weekly newspapers. A. Y. M. C. A. building completed 1890–1 contains a gymnasium, baths, double bowling alley, reading-room, parlor, social-room, and game-room. The industries of R. include woolen-mills, hub, spoke, and carriage factories, printing-press works, and a large printing, stereotyping, and book-binding establishment. Many citizens are engaged in business in New York. R. was settled 1720, incorporated 1858. Pop. (1870) 6,258; (1880) 6,455, (1890) 7,090.

RAID, n. *rād* [Scot. *raid;* AS. *rad*, a riding, an incursion]: a hostile or predatory incursion; a foray. RAID OF RUTHVEN, a conspiracy led by Alexander Ruthven to seize James VI. of Scotland (q.v.).

RAIKES, ROBERT: see SUNDAY SCHOOLS.

RAIL, n. *rāl* [It. *riga*, a streak, a line: Dut. *regel*, a row or line: Ger. *riegel*, a bar, a rail: W. *rhaid*, a rail]: a bar or strip of wood, metal, etc., extending from one upright post or support to others; in *arch.*, the horizontal bar in any piece of framing, such as panelled stone or in wood-work (doors, shutters, etc.) which incloses the panels—the upright pieces being termed styles: one of the iron bars on which a railway-carriage runs; the railway itself: V. to inclose with rails or railing. RAIL'ING, imp.: N. a fence or barrier made of posts and rails; materials for rails. RAILED, pp. *rāld*. RAIL-FENCE, a framework of upright posts and wooden or other rails. RAIL or LIFE GUARDS, in *locomotive engines*, strong iron rods, reaching down within two inches of the rails, to catch and throw to one side any obstruction that may chance to be on the rails. RAILROAD, n. *rāl'rōd*, or RAIL'WAY, n. *-wā* [*rail*, and *road* or *way*]: road or way on which bars of iron are laid for the easy passage over them of wheel carriages; a prepared and exclusive way for passenger and goods traffic by means of locomotives (see RAILROADS, or RAILWAYS: also ELECTRIC RAILWAY: ATMOSPHERIC RAILWAY: RAILROADS, ELEVATED: STEAM ENGINE). RAILWAY-CHAIRS, grooved pieces of cast-iron bolted on to the sleepers, in which the rails are firmly set. RAILWAY-PLANT, the tools, machinery, locomotives, carriages, trucks, etc, for either constructing or working railways. RAILWAY-SLEEPERS, planks of wood laid not far apart across the permanent way, on which the chairs are fastened. RAILWAY-SLIDE, a turn-table. BY RAIL, by railway. RAILROAD POSTAL SERVICE (see POST-OFFICE).

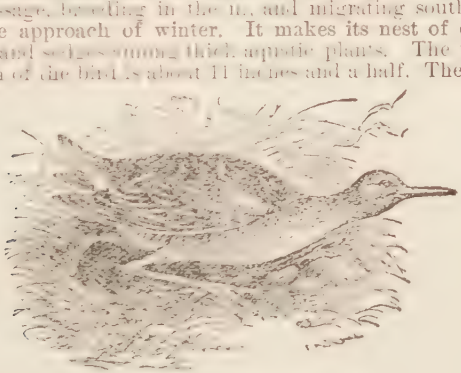
RAIL, n. *rāl* [F. *râle;* Fin. *raakka*, the rail: It. *ragliare*, to bray like an ass]: a bird having peculiar harsh notes; a name applied to the corn-crake or land-rail, and the water-rail.

RAIL, n. *rāl* [AS. *hragel* or *ragel*, a garment: OHG. *hragil*, a garment]: a woman's upper garment, as *night-rail;* a cloak; a night-gown.

RAIL, v. *rāl* [Dut. *rillen*, to tremble, to shiver: Norm. F. *raier*, to flow: connected with *rill*]: in *OE.*, to trickle as tears, or as blood from a wound. RAIL'ING, imp. trickling. RAILED, pp. *rāld*, trickled.

RAIL, v. *rāl* [F. *railler*, to jest or sport: Dan. *ralle*, to rattle: Norw. *ralla*, to tattle: Dut. *rallen*, to talk idly: Sp. *rallar*, to grate, vex]: to use opprobrious words; to utter reproachful language; to scoff. RAIL'ING, imp.: ADJ. opprobrious: N. insolent or reproachful language. RAILED, pp. *rāld*. RAIL'ER, n. *-ėr*, one who rails or insults. RAIL'INGLY, ad. *-li*. RAILLERY, n. *rāl'er-i* or *rāl'-* [F. *raillerie*]: slight satire; banter; good-humored irony. RAILLEUR, n. *rāl-yėr'* [F.]: one who uses raillery; a banterer.

RAIL (*Rallus*): genus of birds of order *Grallæ*, family *Rallidæ*; having a slender bill, longer than the head, the body of very compressed form, wings of moderate length, a very short tail, long and strong legs, and long toes. The only European species is the COMMON R. or WATER R. (*R. aquaticus*), sometimes called *Bilcock;* frequent in marshy situations and reedy margins of lakes and rivers, though it often eludes observation, threading its way among reeds, and diving when compelled to betake itself to open water. It does not rise, except in extreme necessity; and when flushed flies heavily. It is plentiful in most parts of the continent of Europe, where it is generally a bird of passage, breeding in the N., and migrating southward on the approach of winter. It makes its nest of coarse grass and sedges among thick aquatic plants. The whole length of the bird is about 11 inches and a half. The sexes



Water Rail (*Rallus aquaticus*).

are very similar in plumage, olive-brown, marked with black above; bluish-ash color beneath, with white transverse markings on the belly. The water R. feeds on worms, mollusks and soft vegetable substances. It is in the highest esteem for the table. America produces a number of species of R., as the VIRGINIAN R. (*R. Virginianus*), a species rather smaller than the Water R. of Europe, and much resembling it in habits; a bird of passage, and in many parts of N. America very abundant; the GREAT RED-BREASTED R., or FRESH-WATER MARSH HEN (*R. elegans*), a much larger bird, fully 20 inches in length, inhabiting the extensive marshes of the southern states; the CLAPPER R., or SALT-WATER MARSH HEN (*R. crepitans*), extremely abundant in the salt marshes of the same regions, its whole length about 15 inches; all of which are esteemed for the table, the eggs of the Clapper R. being also collected in great numbers as a delicacy. The name Clapper R. is from its cackling cry. The MANGROVE HEN (*R. longicostris*) abounds on the muddy shores of the W. Indies, and its flesh is held in highest esteem.—In general form, and in the character of their plumage, all these and the other species are very similar.

RAIL'ROADS, EL'EVATED: railroads raised above the surface of streets or of the ground generally, sufficiently to admit of ordinary travel under them. At present (1891) they are confined to New York, Brooklyn, and Chicago, though their erection is under discussion in Boston and Philadelphia. In New York proper 4 lines are in operation, known as the 2d, 3d, 6th, and 9th ave lines; and all are under the management of the Manhattan Elevated Railroad Company. These roads all extend directly or by branches from South ferry at the Battery to the Harlem river. There, a new system, known as the Suburban Rapid Transit, joins the 2d and 3d ave. lines with an intermediate line beginning at 146th st., and extends to 160th st., 170th st., and Fordham and the Bronx river respectively. In the city the roads are wholly elevated, in the annexed suburban district they are partly elevated and partly depressed. In Brooklyn there are 5 lines, controlled by two companies, the King's Co Elevated and the Union Elevated Railroad companies. The lines are the Fulton st. (Kings Co. Elevated), and the Grand ave. and Lexington ave., the Fulton Ferry and Myrtle ave., the Broadway, and the South Brooklyn lines (Union Elevated). All but the Broadway line begin at the New York and Brooklyn Bridge or at Fulton ferry, three extend to East New York, one to South Brooklyn, and one to Ridgewood. In New York proper and Brooklyn the fare is uniformly 5 cents for the entire or intermediate distances. In 1896 the Manhattan railway co. operated 36.14 m. of elevated roads, with 334 locomotives and 1,122 passenger cars; total no. of miles run, 9,827,702; passengers carried, 184,703,636; gross receipts, $9,256,932; expenses, $6,209,681; net earnings, $3,047,251; total cost of road, $53,392,182.

In Liverpool, England, an elevated railroad was opened 1892, which is about 6 m. long. The motive power is electricity.

RAIL ROADS (called in Britain and Brit. Colonies, RAIL WAYS): prepared road-beds whereon are laid parallel steel or iron bars on which cars carefully adjusted can be moved with ease and rapidity. The origin of these now vast undertakings is traced to a contrivance for simplifying the transit of coal from the mines in Northumberland and Durham, England, to the places of shipment on the Tyne and Wear. The invention consisted of a double parallel line of wooden beams or trams fixed to the ground, and furnished with flanges to prevent the wheels of vehicles from slipping aside. Along these flanged beams wagons were drawn by horses with such comparative ease, that instead of a load of 17 cwt. on a common road, a load of 42 cwt could be drawn by one horse. These new thoroughfares, called tramways, were made across fields, the proprietors of which received a certain rent for the right of way: the term in England is way-leave. The invention, in its early stages, owed nothing to men of scientific attainments, but was the work mainly of obscure mechanics or illiterate enthusiasts. Its date is uncertain, but by good authorities it is referred to the period 1602–49. From the n. coal districts it gradually came into use in other mining districts in England, and in s. Scotland. The 17th c. was not favorable to mechanical improvement. Not till about 1700 was there any marked advance on the original tramway. The first step was the clothing of the wooden beams with long slips of iron, to prevent excessive wear. A more complete improvement, about 1740, was the substitution of cast-iron rails fixed in parallel lines on cross wooden sleepers. This species of railway became general in mining districts 1745–75; yet railways did not attract attention as being suitable for general traffic. The success of canals not only turned the public mind in that direction, but raised up a powerful canal interest, unfavorable to railroads.

The use of cast-iron rails led to an improved method of traction. Instead of employing a single large wagon, the plan of linking together a series of smaller wagons was adopted—the germ of the modern train. The next improvement consisted in putting flanges on the wheels instead of the rails, with great increase in facility of transit. The draft continued to be by horses; but as the railway system seemed to possess immense capabilities of expansion, many minds labored in devices to substitute steam-apparatus. The invention of the locomotive, like that of R., was the work of successive geniuses. Watt had shown the practicability of fixed steam-engines; what was now wanted was an engine that would travel by its own internal impulse. The merit of inventing a self-acting steam carriage is allowed to be due to Richard Trevethick, a clever but eccentric engineer. In 1802 he took out a patent for a steam-carriage, and this novel machine he exhibited to crowds of admiring spectators on a piece of ground near London. Immediately afterward he adapted his carriage for drawing wagons on R., which it successfully executed on the Merthyr-Tydvil railway 1804. This first locomotive was very imperfect: it drew only 10 tons of bar-iron at the

rate of five m. an hour. Trevethick did not remain in England to improve on his invention, nor did the moderate achievements of his machine immediately induce others to make any distinct advance on his ingenious contrivance. There was a universal belief among engineers that the locomotive could not gain great speed, nor ascend a moderate incline, nor draw a heavy load, unless the wheels were provided with a cogged rim to work on a corresponding rack along the rails. Numerous schemes were made the subject of patents to overcome this imaginary difficulty. That locomotives running with smooth wheels on smooth rails, by mere weight and friction, as exemplified by Trevethick, could draw heavy loads up a moderate incline, was at length, 1811, established as a fact by Blackett, a coal-proprietor, on the Wylam railway. The means for imparting speed alone remained to be given.

Locomotive power was employed by George Stephenson (q.v.) on the Killingworth railway 1814, with such success that it was afterward applied on the Stockton and Darlington railway, for which the first act of parliament was passed 1821. In this last undertaking, Stephenson was encouraged by the generous and enlightened aid of Edward Pease, member of the Society of Friends, whose name will always be associated with the history of railroad enterprise. The Stockton and Darlington was the first railway in which carriages travelled with passengers; yet, even with the measure of success so secured, the locomotive was still an imperfect machine, for its rate of progress was little faster than the walk of a horse. Acceleration was now the grand desideratum, and it was attained by a very simple contrivance—sending the waste steam up the chimney so as to cause a powerful draft in the fire; rapid generation of steam was the consequence, and by this appliance, with the multitubular boiler, the machine entered on a new epoch (see STEAM-ENGINE).

It certainly seems very strange, that notwithstanding the proved feasibility of R., the public at large could not be stimulated to give heed to the subject. It was shown in this, as in the analogous case of steam-boats, that the world tends to remain skeptical of an invention long after it has been practically established beyond cavil. The idea of extending R. over the kingdom for general traffic was perhaps first conceived and urged on the public 1820–24 by Thomas Gray of Nottingham, full of enthusiasm, but unfortunately no mechanic, and seemingly unacquainted with the advances which had been made from the old belief, that locomotives must have cogged wheels. 1824, Oct. 29, Joseph Sanders of Liverpool issued the prospectus of a railway from Liverpool to Manchester; and this line, surveyed by Stephenson, was, after much opposition, sanctioned by the legislature, and was opened for traffic 1830, Sep. 15. Provided with some of George Stephenson's improved locomotives, the success of the line was immediate and complete; and the great railway system was inaugurated.

Then began that course of commercial enterprise, unreg-

ulated and often wasteful, which has since assumed such importance.

Speculators multiplied competing lines, or built circuitous lines afterward superseded by others more direct, at a cost almost beyond belief. There is now in Britain a body of general railway law—the most important dating from 1845—covering an immense diversity of details; besides a most explicit code of regulations regarding the mode of bringing railway bills before the houses of parliament and carrying them through all the legislative steps. Every scheme is subjected to a sifting investigation, including successive reports from various governmental committees and boards, which reports in turn undergo discussion on all points involving private or public interests. The legislation seems almost painfully complete, nevertheless, as will be noted hereafter, there is great and increasing complaint that protection for important public interests is inadequate against the power of great railway combinations.

The rapid construction of the railroad system of the United States has been attended by two features of management which have led to the adoption of prohibitory statutes by various state legislatures—'watering stock' and 'wrecking roads.' 'Watering stock' means the issue by a company under various pretexts of more capital stock, common, preferred, or bonds, than its combined franchises, rolling stock, and other property are worth. This has been done by the vote of the directors with and without legal permission, for in general it is necessary that the legislature should sanction an increase in capital stock. The additional stock so issued is apportioned among the holders of the old stock on a specified percentage of new stock to old.—'Railroad wrecking' has been carried on by unprincipled manipulators, with and without the aid and knowledge of directors, by means of a variety of injuries done to the railroad as a property and to its stock as an investment, for the purpose of depreciating both so that the projectors or owners will be forced to sell out their interests at a low rate to save themselves from a greater loss. After a road has been so wrecked and its directors or stock-holders 'frozen out,' the backers of the manipulator assume its management and 'boom' it or sell it to a rival company or one desiring it for a connecting link on an existing route.

In issuing the prospectus of a British railway, an estimate is given of the probable amount of traffic of all kinds; but in recent years in every case, sometimes to a surprising degree, the traffic exceeds expectation. R. have not improperly been compared to navigable rivers. To inland and not easily reached towns they impart the character of a seaport placed in ready communication with all the world. The exciting of a desire to travel, and the developing of local trade and resources, accordingly attend on railway undertakings, and the consequence is, in Britain as in America, universal activity and prosperity, and the creation of wealthy industrial centres. R. were at

first detached undertakings between one large town and another; but now many of the companies have for mutual advantage amalgamated in groups; and in a number of cases for economy in working, lesser lines have been leased to companies of larger means. In this, as in most other commercial concerns in Great Britain, and equally in the United States, the tendency is to concentrate business in the hands of monopolists possessing large capital, or at least those having great capacity and disposition to borrow. There are doubtless conspicuous advantages in a union of railway interests; but it is not less conspicuous that the 'railway interest' has become a formidable power in the state, and is able to carry lines almost anywhere, in disregard of land-proprietors or town-authorities. Making every allowance, therefore, for the high social value of the railway system —indeed by reason of this very value—it has certainly reached a point of despotic overbearance that requires some species of control more effectual than has yet been put into operation.

This question, prominent in this country, has attracted much attention in Great Britain, where the govt. has tried in various ways to ameliorate the evils and to control the excesses of railway enterprise. One of these efforts was the appointment of a Joint Committee of Lords and Commons, and a bill based on the report of that committee was before parliament 1874. One of the conclusions arrived at by this committee is worth noting: 'That no means have yet been devised by which competition can be maintained. Nor is there any reason to suppose that the progress of combination will cease until Great Britain is divided between a small number of great companies.' A principal feature in one line of governmental effort has been the appointment of a mixed tribunal—of three eminent men—for regulation and control of the working of railways.

The only alternative proposed in Britain to the present system is the government purchase of R. An act of parliament was passed 1844 for the purpose of enabling govt. to purchase all lines after they had respectively been 21 years in existence, dating from the passing of the act. This statute came into operation 1865; but the Joint Committee of 1872 reported that they did not deem the terms of the 1844 act suited to the present condition of railway property, or ever likely to be adopted by parliament. There is much to be said on both sides of this question; most of the arguments advanced *pro* and *con* may be found in articles respectively in the *Quarterly Review* and *British Quarterly Review*, 1873, April.

Construction.—R. in the United Kingdom are of two kinds—double and single. The double consists of two lines of rails—an *up*-line toward, and a *down*-line from the metropolis or principal centre of traffic. By far the larger number of lines are of this double variety. Single lines, with sidings where trains may pass each other, are mostly of recent construction, and in Scotland On some of the main lines to London it has been found necessary to add a

third, and in some cases a fourth line to accommodate the enormously increased traffic. Whether double or single, all the lines are inclosed.

In the United States R. are single, double, and quadruple, with as many sidings and spurs and at as many points as passenger and freight traffic may demand. The tracks are frequently without fences, except in cities and populous towns. In passing through small places and approaching level crossings in the country or the suburbs of a city, engineers ring the bell and blow the locomotive whistle; and in all places where accidents are liable to occur, sign-boards are erected on high poles at crossings, bearing a caution to 'look out for the locomotive.' In important cities and towns the depots are commodious, comfortable, and, in many instances, architecturally attractive; in fashionable suburbs, depots and grounds are laid out with artistic skill, and in season are beautified with flowers, lawns, and shrubbery; in little used country depots there is no pretense to anything but a temporary shelter. The seats in ordinary passenger cars are arranged in rows, with a passage up the middle for the conductor, who by means of a small platform at each end, can step from car to car, and perambulate the train at pleasure, which he does frequently in the performance of his ticket-taking duty. The wheels being attached to a swivel or *bogie* framework, the cars can turn round corners with ease, notwithstanding their great length.

The construction of a railway is the business of contractors, who execute the works by estimate, according to the plans and specifications of the engineers. A railway contractor is a capitalist with a practical knowledge of earth-digging, blasting rocks, pumping, embanking, boring and building tunnels, erecting bridges, and other rough operations. He possesses a stock of the various necessary apparatus, rails, tools, etc., including horses, wagons, and locomotives for dragging materials.

Signals.—The signaling arrangements form an important part of railway construction. The most common form of signal is the semaphore; and at night, colored lights. A red light signifies danger; a green, caution; and a plain or white light, that the line is clear. Much care is given to arrangement and construction of crossings, junctions, etc., with their numerous *switches*, or movable rails, used for changing the direction of a train from one line to another. The *switches* are generally worked directly from the signal-stations, and are so arranged that their points shall *not* face toward the advancing traffic. Many improvements have been lately introduced in signaling, crossings, etc., all with a view to increased safety. The 'block' system has been adopted by the principal railway companies, particularly in the neighborhood of busy centres of traffic. Under this system each signal-station is in direct telegraphic communication with the nearest signal-stations, both up and down the line, and a train is not allowed to pass any signal-station until the train immediately preceding it has started from the next station in

advance. Thus the engineer may push on without hesitation from point to point; and thereby the traffic is expedited and safety increased. The system of *interlocking* has also been extensively introduced. Under this system, the signal operator can *lever only one* signal—namely, that which corresponds to the track which, from the position of the switches, is *clear;* and before he can alter the position of the switches, he is compelled to return this signal to 'danger.'

Curves and Gradients.—Engineers endeavor to render their lines as level and straight as possible, but circumstances often necessitate the use of considerable curves and gradients. As a general rule, there are few curves of less than three-eighths of a mile, or 30 chains' radius; when they are employed, the exterior rail is super-elevated, to counteract the centrifugal force, otherwise a quickly moving train might leave the rails. Gradients being expensive to work according to their degree of inclination, few are more steep than 1 in 60, though 1 in 30 is not unknown. On steep gradients, additional locomotives are generally employed to assist the train locomotive to the next level. On local and private lines much steeper gradients and sharper curves are common.

Gauge and Earth-work.—In the early stage of railway operations the gauge, or width between the rails, was adapted to the common road-wagons that were to be put upon them, and it happened that the gauge between the wheels of these wagons was 4 ft. 8½ inches; this gauge was accordingly adopted on most of the earlier English railways; and notwithstanding the keen contests of engineers, who were generally favorable to a 5 ft. or 5 ft. 3 inches gauge—Brunel contending for 7 ft.—this original 4 ft. 8½ inches gauge—measured from the inside of one rail to the inside of the other—was fixed by a public act 1846 as applicable to all railways in England and Scotland—the Great Western and certain branches excepted, on which the gauge was regulated at 7 ft. Because of inconvenience in communicating with other lines, and for other reasons, the Great Western has found it advisable to conform to its neighbors, and has now relaid its lines on the standard gauge. In Canada there are 14,000 m. of railway, generally with a gauge of 4 ft. 8½ inches (there called 'medium' gauge), which is the gauge preferred also on the majority of roads in the United States.

Ballast.—This is the name given to the mass of broken stones or dry gravel on which the sleepers are placed, and which serves to keep them steady. Material for ballast is generally got in the cuttings or near the line, but is often brought a considerable distance. The term *ballast* originated in Britain in the practice of using the gravel-ballast emptied from the ships in the Tyne for the tram and railways in the neighborhood of Newcastle.

Rails.—Rails are now generally of steel, which material is found to reduce greatly the cost of maintenance, and is superseding the old-fashioned rails of wrought iron. Rails differ in shape and weight. The most common form is

the 'double-headed' rail, which is reversible. In the United States steel rails are generally rolled in 30 ft. lengths, and weigh 56 lbs. to the yard. The ends of the rails are now almost always joined together by a plate of malleable iron placed on each side, called a fish-plate; two of these are used at each joint, and are bolted together by strong bolts passing through the rails. In the joining of the rails end to end, to make a smooth surface, great care is bestowed.

In the United States standard cross-ties (called sleepers in Great Britain) are made of white and rock oak, chestnut, and pine, the latter predominating in the s. states. They are 8½ ft. long, 7 in. thick, and not less than 7 in. wide, and are laid with about 10 in. between the edges of bearing surfaces at joints. Longer ties are used in certain locations.

Tunnels and Viaducts.—Tunnels are made when the excavations would be too deep, or would distigure the grounds near a mansion: see TUNNEL. Viaducts or bridges are frequently of stone, and of handsome architecture, but now commonly of malleable iron or steel girders, of various forms, set in stone or iron piers. In the construction of viaducts, there is a growing boldness of conception. See BRIDGE.

Maintenance of Way.—Every railway, great or small, is at considerable expense in keeping the line in proper working order, for which purpose a staff of officials is required. Besides a gen. supt. there is an effective staff of subordinates and workmen, whose duty it is to watch over and repair the permanent way.

ROLLING STOCK.—Under this head are comprehended locomotives, and the various kinds of cars, the whole forming an important part of railway undertakings.

Locomotives.—Locomotives are of several kinds, varied in construction to suit the traffic for which they are designed. In the United States they are known as passenger, freight, and drill engines. They have generally 4 small wheels at front and 4 large or driving wheels under the boiler and cab; and the tenders, carrying fuel, etc., have 8 small wheels. An 8 wheel passenger locomotive with tender costs in the United States about $8,500.

Cars.—There are three distinct kinds of cars (called carriages in the British service) to suit the several classes of passengers. In Britain, each first class carriage consists of three or four distinct compartments; but in the other classes backs of the seats are in many cases not carried to the roof, leaving the upper part of the carriage open fore and aft. At night the carriages are lighted with lamps; on the metropolitan lines gas is sometimes used. Special saloon-carriages are reserved for royalty. The first-class compartments are handsomely fitted up, and in winter are heated by hot-water tins. Recently one of the leading English companies abolished its second-class carriages; and some companies now run third class carriages with all trains. Sleeping-cars and the American Pullman cars have been introduced into the United Kingdom. In the

United States the cars are classified as ordinary passenger, smoking, parlor or drawing room, dining, sleeping, Pullman and Wagner palace, U. S. postal, freight, box, express, refrigerator, coal, and platform cars. A palace sleeping-car costs about $15,000, and if one of a vestibuled train about $17,000. These trains are luxuriously furnished and have dining, library, musical, and observation rooms, with steam heat and electric lighting.

In almost every railway in the United Kingdom passengers are of three classes—first, second, and third. Though from the fares charged, first-class carriages possess an air of exclusiveness, no more objection is popularly taken to them than to the use of boxes in theatres; and indeed they are universally recognised as an advantage, for the reason that by the comparatively high fares exacted for them, the companies are enabled to lower the charges for second and third-class passengers. On some lines, compartments are set apart for ladies if they choose to use them. Special compartments of each class are now also allotted to smokers, a custom contrasting with the special *non-smoking* carriages common on the European continent. The first-class passengers have distinct waiting-rooms at the termini and stations, with generally a waiting-room in addition for ladies; for the second and third class, there is a waiting-room in common. The several waiting-rooms are neatly fitted up, and provided with suitable conveniences, including basins and water for washing the hands.

In the United States passenger and freight rates are fixed by combinations of R. Though the Interstate Commerce Commission (q.v.) seeks to regulate traffic and prevent discriminations among competing roads nearly all roads engage in 'rate-cutting,' or carrying passengers and freight at less than the mutually established rates. As a rule companies in the United States are liberal in dealing with the public, offering special inducements for large freight and passenger transportation, selling tickets for round trips (i.e. both ways) from one end of the country to the other at a large reduction from regular rates, and providing excursion, monthly, and 50-trip tickets to city business-men residing in adjoining cities or suburbs.

All trains in the United States are accompanied by a conductor, baggage-master, and one or more brakemen, and the sleeping and parlor cars also have several porters, generally colored. A peculiarity of railway travelling in Great Britian consists in the privacy secured to passengers. Instead of being intruded on, as in the American and continental railways, by the constant perambulation of the conductor or guard through the train, they are left unmolested to read, talk, or sleep. This seclusion, however, has this disadvantage—that passengers are unable to call for the assistance of the guard in cases of threatened outrage by one of their number. To the numerous devices for summoning the guard, or, if need be, stopping the train, there is unfortunately the grave objection that if passengers were enabled to call the guard at pleasure, they would frequently do so for no sufficient reason, as whim or imag-

inary fear prompted; also that the unexpected stoppage of trains would seriously derange the keeping of time, and in many lines jeopardize the safety of all the passengers. It seems impossible to devise any plan free of this species of objection, unless recourse be had to the American construction of carriages, and the free perambulation of the conductor through the trains—a remedy which involves a revolution in English railway transit, and in English customs.

To enable companies to reckon easily with each other as regards intercommunication of traffic in passengers, goods, use of carriages, etc., an institution called the Clearing-house has been established: see CLEARING-HOUSE, RAILWAY.

Statistics:—Railways in the United Kingdom. Official reports of the R. in the United Kingdom for 1889 showed length of single lines open 9,090 m., double lines 10,853 m., total 19,943 m., an increase of 2,010 m. since 1880. The authorized capital was £876,595,166 ($4,260,272,506), an increase of £74,581,162 ($362,464,447) since 1880. The receipts were from passengers £32,630,724 ($158,595,318), freight £41,086,333 ($199,679,578), miscellaneous £3,307,960 $16,076,685), total £77,025,917 ($374,351,581). During 1879–89 the tonnage of minerals carried increased from 149,250,000 tons to 211,750,000 tons, and the tonnage of merchandise from 62,000,000 tons to 85,000,000 tons. The number of persons killed in the working of the R. 1889, as reported to the London Board of Trade, was 1,076; persons injured 4,836, passengers killed 183, injured 1,829; employés killed 435, injured 2,769, proportion of persons killed 1 in 10,000,000, injured 1 in 900,000. Of suicides there were 84; of trespassers, 267 were killed and 122 injured; of persons passing over the R. at level crossings 72 were killed and 42 injured; and from miscellaneous causes 35 persons were killed and 74 injured. In addition the companies reported 63 persons killed and 6,145 injured from accidents on their premises not connected with the movement of rolling stock.

European Railways.—The first European country that availed itself of railway locomotion was the small kingdom of Belgium, where a number of lines in connection with each other were constructed 1834–36, and in about ten years afterward the group was nearly completed in a well-devised and comprehensive scheme. From Belgium railways spread to France, where they were laid down on a plan prescribed by the govt., which offered special encouragement to capitalists. The method adopted was to give the land and make the bridges, but besides these heavy items of expenditure, the govt. was in a number of instances at the cost of the entire permanent way. So far favored, the promoters, who formed a company, had only to find capital to work and maintain the line. The govt., however, relinquished the property only on the footing of a lease for such a number of years as a company was disposed to be satisfied with. Tenders were ordinarily taken from competing bodies of promoters; in this manner the

'concession,' or right of tenancy, has been adjusted at from 50 to 99 years; at the end of the prescribed periods the lines will pass into the hands of the govt. Latterly, the French system has outgrown this kind of tutelage; and there is a disposition in companies to act on an independent footing; the state, however, has secured a very general right of property in the existing lines, whether by the method of assistance originally in use, or by giving large subventions of money, on the plan of receiving a share of profits after a certain dividend has been reached. By means of these subventions, as well as a species of guaranteed monopoly of traffic, the profits to shareholders in some French lines reach 10 to 12 per cent. Within 99 years from 1852, a large proportion of the French railways will lapse into possession of the state. On one or other of the various plans of govt. helping companies, and preventing ruinious competition, nearly the whole railway system of continental Europe, Asia, and Africa is established. The principal continental railways, particularly in France and Belgium, are double lines, and under good management; but the rate of transit is generally slower than in England, and the formalities as to taking tickets and being allowed to enter the trains are exceedingly troublesome.—Latterly, railway management has become in continental Europe an important section of miltary organization. The German and Russian railways are created largely for strategic purposes and under govt. authority. In the Franco-German war the Germans were greatly helped by their skilful use of railways. In the French army, railway-workers constitute a railway regiment. The Austrian army has two railway battalions.

Railroads in the United States.—The first railroad built in the United States was a three-mile line from Quincy, Mass., to tidewater, used for transporting granite from the quarries, begun 1826, completed 1827. In 1827 the second road was built, a 9-m. line from the top of the mountains at Mauch Chunk, Penn., to the Lehigh river, for transporting coal from the mountain mines. The cars were hauled up by mules (now by cable) and descended then as now by gravity. The third road was built 1828 by the Delaware and Hudson Canal company, to transport coal from their mines to Honesdale, where it was shipped for tidewater by canal. The Baltimore and Ohio railroad followed, then the South Carolina road, and after that the Camden and Amboy (to connect Philadelphia with New York), and several short-line roads in N. Y., Ky., and O. Railroad building for passenger and freight transportation really began 1830, and by the close of that year there were 23 m. of road in operation. The increase since has been (1831) 95 m.; (1832) 229; (1833) 380; (1834) 633; (1835) 1,098; (1836) 1,273; (1837) 1,497; (1838) 1,913; (1839) 2,302; (1840) 2,816; (1850) 9,015; (1860) 30,600; (1870) 52,856; (1880) 93,526; (1894) 175,441. The first locomotive engine run in the United States was the English-built Stourbridge Lion, at Honesdale, Penn., 1829; and the first American-built railroad engine was constructed for the South Caro-

lina railroad, and made its initial run 1830, Nov. 2. As above shown the first object of the railroad was to promote commerce, then to bind large cities together, afterward to open and develop new territory, and since to facilitate the rapid transport of passengers and freight.

SUMMARY OF RAILROAD MILEAGE IN THE UNITED STATES, 1893, JUNE 30.

State or territory.	Official.	Unofficial.	Total.
Alabama	3,565·81	97·25	3,663·06
Arkansas	2,274·65	150·18	2,424·83
California	4,506 32	264·58	4,770 90
[illegible]	[illegible]	[illegible]	[illegible]
Connecticut	1,013·22	.....	1,013·22
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Idaho	[illegible]	[illegible]	[illegible]
Illinois	[illegible]	162·50	10,486·79
Indiana	[illegible]	[illegible]	6,297·57
Iowa	[illegible]	[illegible]	8,475·37
Kansas	[illegible]	[illegible]	[illegible]
Kentucky	2,482·79	515·72	2,998·51
Louisiana	1,801·06	198·20	1,999·26
Maine	1,358·69	25·84	1,384·53
Maryland	1,176·05	120·59	1,299·64
Massachusetts	[illegible]	[illegible]	[illegible]
Michigan	6,974·31	623·69	7,598·00
Minnesota	5,853·87	58·00	5,911·87
Mississippi	2,439 61	26·00	2,465·61
Missouri	6,316·62	67·88	6,384·50
Montana	2,693 40	.....	2,693·40
Nebraska	5,529·22	.....	5,529·22
Nevada	922·62	10·00	932 62
New Hampshire	1,155·59	41·24	1,196·83
New Jersey	2,084·35	69·27	2,153·62
New York	7,918·01	120·27	8,038·28
North Carolina	[illegible]	[illegible]	[illegible]
North Dakota	2,320·46	.....	2,320·46
Ohio	8,040 68	322·03	8,362·71
Oregon	[illegible]	[illegible]	[illegible]
Pennsylvania	8,993·24	310 95	9,294·19
Rhode Island	222·65	3·40	226 05
South Carolina	2,575·74	4·25	2,579·99
South Dakota	2,674 12	29·58	2,703·70
Tennessee	[illegible]	[illegible]	[illegible]
Texas	8,921·13	253·93	9,175·06
Vermont	950 71	9·61	960·32
Virginia	[illegible]	[illegible]	[illegible]
Washington	2,331·91	435·33	2,767·24
West Virginia	1,740·17	78 04	1,818·21
Wisconsin	5,951·34	59·00	6,010·34
Wyoming	1,156·14	.....	1,156·14
Alaska	.....	.....	.....
Arizona	1,041 08	119·12	1,160·20
District of Columbia	28·35	.....	28·35
Indian Territory	1,188·27	.....	1,188·27
New Mexico	1,372·81	39·20	1,412·01
Oklahoma	198·22	.....	198·22
Utah	1,339·86	.....	1,339·86
Totals	170,332·30	6,128·77	176,461·07

In this table the 'official' mileage comprises the total reported by the operating companies directly to the United States Interstate Commerce Commission, and the totals are for single trackage. As recognized authorities differ, the following summaries should be considered in connection with the above table: According to Poor's *Manual*, the total

single-track mileage, 1893, June 30, was 175,441·77, and of second, third, fourth, and siding tracks, 53,410·89, making a total trackage of 228,852·66 m. The new construction during the calendar year 1893 was 2,828·39 m., which would make the total single-track mileage at the end of that year 178,032·49. Deducting 279·13 m. of abandoned or otherwise decreased trackage, and the net total, 1893, Dec. 31, was 177,753·36 m. The *Railway Age* reported the new construction during the calendar year 1894 as 1,919·13 m., making the total single trackage 1894, Dec. 31, 179,672·49 m. On the last date the greatest state trackage was: Ill., 10,576 m.; Penn., 9,564; Tex., 9,272; Kan., 8,931; O., 8,652; Io., 8,513; and N. Y., 8,150—a total of 63,658 m., or more than 35 per cent. of the entire mileage of the country.

In the following summary of railroad operations in the fiscal year ending 1893, June 30, where two statements occur, the first is from Poor's *Manual* and the second (in parenthesis) from the report of the Interstate Commerce Commission: Mileage of steel rails in track, 191,717·71; iron rails, 37,134·95; rolling stock: locomotive engines, 36,-012, passenger cars, 27,169, baggage and mail cars, 7,805, freight cars, 1,161,282—total revenue-producing cars, 1,-196,256 (employés, 873,602). The liabilities of operating companies were: Capital stock, $5,021,576,551; bonded debt, $5,510,225,528; unfunded debt, $409,909,043; current accounts, $381,575,253—total, $11,323,286,375 (capitalization $10,506,235,410, equivalent to $63,421 per m. of line). The assets comprised: Cost of roads and equipment, $9,-573,703,214; real estate, stocks, bonds, and other investments, $1,671,841,101; other assets, $244,614,098; and current accounts, $239,878,388. The revenue account showed: Passenger receipts, $311,978,342; freight, $808,494,668; miscellaneous, $88,168,488—total, $1,208,641,498 ($1,220,-751,874); net earnings, $358,648,918 ($392,830,575, equivalent to $2,314 per m. of line); receipts from other sources, $111,166,837 ($149,649,615); total available revenue, $469,-815,755 ($542,482,190); payments, $440,290,213 ($534,363,-445); surplus, $29,525,542 ($8,116,745). According to Poor's *Manual*, the payments comprised: Rentals, tolls, etc., $64,698,368; interest on bonds, $236,755,805; other interest, $7,107,718 (fixed charges, $431,422,126); dividends on stock, $93,537,681; miscellaneous, $38,190,641 (dividends and other payments, excepting fixed charges, $102,-941,289). The report of the Interstate Commerce Commission, which acknowledged incomplete returns, gave the casualties of the year as follows: Number of employés killed, 2,727; injured, 31,728; passengers killed, 299; injured, 3,229. During the year 593,560,612 passengers were carried, and 745,119,482 tons of freight moved.

Speed Records of 1895.—In the latter part of 1895 several new records for railroad speed were made in Great Britain and the United States. The first was made by a train of the Great Northern Northeastern and North British railway, on Aug. 21–22, which ran from King's Cross station in London to Aberdeen, a distance of 523½ m., in the act-

ual time of 8 hours 40 minutes, or at the rate of 60·4 m. per hour, and in running time (deducting stops) in 8 hours 28 minutes, or at the rate of 61·8 m. per hour. On Aug. 22–23, a new fast train of the London and Northwestern railway made the run from Euston station, London, to Aberdeen, over the West Coast route, a distance of 540 m., in 8 hours 32 minutes, or at the rate of 63 28 m. per hour, and, deducting stops, in 8 hours 25 minutes, or at the rate of 64·15 m. per hour. This last run was considered the British record-breaker. On Sep. 11, a train of the New York Central and Hudson River railroad, 337 ft. long, and weighing 565,000 lbs., made the run from New York to East Buffalo, 436½ m., in 407⅞ minutes, being an average speed for the entire distance, including 28 slowdowns, but excluding two stops of two minutes each for changing of engines, of 64·26 m. per hour. This train was nearly twice as long and twice as heavy as the British racing trains. The New York Central & Hudson River Railroad Co. claims the fastest time for a long distance ever made by a passenger train. On Sep. 24, a train of the same railroad, consisting of an engine and three coaches, made the run between Albany and Syracuse, N. Y., 148 m., in 132 minutes. The same week a newspaper train on the same railroad, weighing 371,107 lbs., made the run from New York to Syracuse at an average speed of 68·3 m. per hour. On Oct. 5, a Delaware Lackawanna and Western train, comprising a locomotive and two Pullman cars, made the run from Buffalo to Hoboken, N. J., 407 m., in 453 minutes. Two records for short distance were made by the Pennsylvania company: Aug. 3, from Landover to Anacosta, Md., 5·1 m., in 3 minutes; and Apr. 21, from Camden to Atlantic City, N. J., 58·3 m., in 45⅞ minutes, or at an average speed for the whole distance of 76½ m. per hour.

RAILROAD MILEAGE OF THE WORLD.

Country.	1880.	1894.	Increase.
EUROPE.—Great Britain	17,935	20,646	2,711
Germany	20,970	29,342	8,372
France	16,100	22,165	6,065
Russia (whole empire)	14,600	22,968	8,368
Austria-Hungary	11,610	18,040	6,430
Italy	5,460	9,006	3,546
Spain	4,630	6,708	2,078
Sweden and Norway	4,400	6,456	2,056
Belgium	2,550	2,802	252
Switzerland	1,635	2,220	585
Netherlands	1,115	1,653	538
Roumania	860	1,598	738
Servia	.....	336	336
Turkey, European	867	904	37
Denmark	985	1,292	307
Portugal	778	1,419	641
Luxemburg	230	270	40
Greece	8	568	560
Bulgaria and E. Roumelia	.....	520	520
Bosnia and Herzegovina	.....	500	500
Malta	.....	7	7
ASIA.—British India	9,141	18,500	9,353
Ceylon	135	230½	95½
Dutch E. Indies	255	922	667

RAILROAD MILEAGE OF THE WORLD—*Continued.*

Country.	1880.	1894.	Increase.
Persia	.....	6	6
Turkey, Asiatic	244	974	730
China and Cochin China	.....	180	180
Japan	75	1,870	1,795
Siam	.....	190	190
Tonkin	.....	62	62
Straits Settlements	.....	118¼	118¼
AFRICA.—Egypt	927	1,275	348
Algeria and Tunis	875	2,216	1,341
Cape Colony	903	2,441	1,538
Natal	99	399	300
Mauritius	66	104	38
Orange Free State	.....	390	390
Reunion	8	78	70
Senegal	.....	246	246
French Soudan	.....	94	94
Kongo	.....	44	44
S. African Republic	.....	422	422
S. Africa, British	.....	344	344
AMERICA.—United States	93,526	179,672	86,146
Canada	6,886	15,320	8,434
Newfoundland	.....	400	400
Mexico	654	6,900	6,246
Costa Rica	74	161	87
Nicaragua	.....	91	91
Guatemala	28	118	90
Honduras	56	37	–19
Salvador	.....	62	62
Cuba	860	1,000	140
Port Rico	7	12	5
Jamaica	25	119¼	94¼
Trinidad	16	54	38
Colombia	75	218	143
Venezuela	70	385	315
British Guiana	21	23	2
Brazil	2,170	6,661	4,491
Argentine Republic	1,530	8,156	6,626
Paraguay	44	150	106
Uruguay	268	974	706
Chili	1,170	1,735	565
Peru	1,150	905	–245
Bolivia	81	500	419
Ecuador	32	63	31
Barbados	.....	24	24
Martinique	12	12	.....
Hawaii	.....	56	56
San Domingo	.....	71	71
AUSTRALASIA.—Victoria	1,195	2,975	1,780
New S. Wales	855	2,501	1,646
S. Australia	678	1,810	1,132
Queensland	635	2,379	1,744
W. Australia	71	1,184	1,113
Tasmania	171	475	304
New Zealand	1,253	2,272	1,019
TOTALS. Europe	101,733	149,420½	44,687½
Asia	9,856	24,053	14,197
Africa	2,878	8,053	5,175
America	108,755	223,879½	115,124½
Australasia	4,858	13,596	8,738
Grand total	231,080	418,002	187,922

In the above table the mileage is approximately for some part of 1894. In a very few instances the last available reports are for 1892 or 1893; in the case of the United States the mileage is for 1894, Dec. 31. In all cases the mileage is understood for single trackage.

RAIMENT, n. *rā'mẽnt* [contr. of *arrayment* (see ARRAY)]: clothing in general; dress; garments; vesture; vestments.

RAIMONDI, *rī-mon'dē*, MARCANTONIO: renowned engraver: 1487 or 88—some time after 1539; b. Bologna. He studied under the celebrated painter Francia. At Venice he engraved prints from Dürer's designs. From Venice he went to Rome, soon attracted the notice of Raphael, and engraved those works after that master that are so highly valued. R. greatly improved his style by imitating the remarkable delicacy and clearness exhibited in the engravings of Albert Dürer and Lucas Van Leyden; and, though, perhaps, in these qualities he did not surpass, or perhaps equal, these masters, he went far beyond them in power and purity of drawing.

After Raphael's death, having engraved some plates after drawings of a licentious kind by Giulio Romano, he was thrown into prison by Clement VII., but was afterward liberated, taken under the protection of the pope, and fully employed. But on the sack of Rome by the Spaniards under the Constable Bourbon 1527 R. was plundered of all that he had, and was obliged to take refuge in Bologna, where he seems to have lived till his death, the exact date of which is not known, but it must have been after 1539, for a print by him, after Giulio Romano, of the *Battle of the Lapithæ*, bears that date.

Good impressions of this eminent engraver's works bear, perhaps, a higher value than any other engravings; but there are numerous impressions from his plates which are of little value, having been thrown off after they had been greatly worn, and repeatedly retouched. The best impressions are without the name of any publisher. After the plates were taken from the stock of Tommaso Barlacchi, they came into the possession of Antonio Salamanca; afterward, they passed through the hands of Antonio Lafreri, thence to Nicholas van Aelst, and lastly, became the property of Rossi or De Rubeis, and by that time they had been completely worn out.—See catalogue of R.'s engravings by Baron Heineken and Bartsch, XIV. Very fine collections are in the Brit. Museum and the Louvre.

RAIN, n. *rān* [AS. *regn*; Ger. *regen*; Fris. *rein*; Goth. *rign*; Icel. *regn*, rain: L. *rigo*, I wet]: water that falls from the clouds or the atmosphere in drops (see below): V. to fall in drops from the clouds, as water; to shower down like rain. RAIN'ING, imp.: N. the falling of rain; the showering or falling of bodies like rain. RAINED, pp. *rānd*. RAIN LESS, a. *-lĕs*, without rain. RAIN'Y, a. *-i*, abounding in rain; wet. RAIN'INESS, n. *-i-nĕs*. RAIN-BEATEN, a. exposed to the rain, or beaten by it. RAIN-FALL, the water that falls in rains. RAIN-GAUGE, an instr. for measuring the quantity of rain which falls at any given place (see below). RAIN-TIGHT, so close as to exclude rain. RAIN-PRINTS, in *geol.*, those markings on the surfaces of stratified rocks, of various formations, presenting an appearance precisely similar to the markings after a shower on the half-consolidated muds and sands of our present shores (see ICHNOLOGY). RAIN-WATER, water that has fallen from the clouds in rain. RAINBOW, n. *rān'bō* [*rain*, and *bow*]: a bow of beautiful colors, formed in the sky by refraction and reflection of rays of light falling on watery particles in the part of the heavens opposite to the sun (see below). RAIN-BOW-HUED, a. having tints or colors like those of the rainbow. RAIN CATS AND DOGS, heavy rain with much wind. RAINY DAY, bad or evil times.

RAIN: water falling in drops from the clouds or the atmosphere. At a given temperature, air is capable of containing no more than a certain quantity of aqueous vapor invisibly dissolved through it, and when this amount is present it is said to be saturated. Air may at any time be brought to a state of saturation by reducing its temperature; and if it be cooled below this point, the whole of the vapor can no longer be held in suspension, but a part of it, passing from the vaporous to the liquid state, will be deposited in dew, or float about in the form of clouds. If the temperature continues to fall, the vesicles of vapor that compose the cloud will increase in number, and begin to descend by their own weight. The largest of these, falling fastest, will unite with the smaller ones that they encounter in their descent, and thus drops of rain will be formed whose size will depend on the thickness and density of the cloud. The point to which the temperature of the air must be reduced in order to cause a portion of its vapor to form cloud or dew is called the dew-point (see DEW).

Hence, the law of aqueous precipitation may be stated: Whatever lowers the temperature of the air at any place below the dew-point is a point of rain. Various causes may conspire to effect this, but the chief cause is the ascent of the air into the higher regions of the atmosphere, by which, being subjected to less pressure, it expands, and, in doing so, its temperature falls. Ascending currents are caused by the heating of the earth's surface, for then the superincumbent air also is heated and consequently ascends by its levity. Air-currents are forced up into the higher parts of the atmosphere

by colder, drier, therefore heavier wind-currents coming beneath them, and thus wedgeways thrusting them upward; and the same result is accomplished by ranges of mountains opposing their masses to the onward horizontal course of the winds, so that the air, being forced up their slopes, is cooled, and its vapor liberated in showers of rain or snow. Again, the temperature of the air is lowered, and the amount of the rainfall increased, by those winds which convey the air to higher latitudes. This occurs chiefly in temperate regions, or in those tracts traversed by the *return trade-winds*, which in the n. temperate blow from the s.w., and in the s. temperate zone from the n.w. The meeting and mixing of winds of different temperatures also is known to produce rain, but not nearly to the extent formerly supposed. It is also increased or diminished according as the prevailing winds arrive immediately from the sea and are therefore moist, or have previously passed over large tracts of land, particularly mountain ranges, and are therefore dry. Since the rainfall is evidently much modified by the temperature of the earth's surface over which the rain-producing winds blow, it follows that sandy deserts, by allowing solar and nocturnal radiation to take immediate effect in raising or depressing the temperature, and forests, by delaying, perhaps, in many cases, counteracting, these effects of radiation, have each a peculiar influence on the rainfall.

Rain is the most capricious of meteorological phenomena, as regards both its frequency and the amount which falls in a given time. It rarely or never falls in certain places, which are on this account designated the rainless regions of the globe—the coast of Peru; the great valley of the rivers Columbia and Colorado; Sahara, in Africa; and the Desert of Gobi, in Asia, are examples; while, on the other hand, in such regions as Patagonia, it rains almost every day. The quantities recorded at some places to have fallen at one time are enormous. In Great Britain an inch in a day is considered a very heavy rain. In many parts of the Highlands of Scotland, three inches frequently fall in one day. 1863, Dec. 5, there fell at Portree, in Skye, 12½ inches in 15 hours; and on the same day, 5·2 inches fell at Drishaig, near Loch Awe, where also, two days afterward, 7·12 inches fell in 30 hours. But in continental, especially tropical countries, the heaviest single showers have been recorded. The following are a few of the most remarkable: At Joyeuse, France, 31·17 inches fell in 22 hours; at Geneva 30 inches in 24 hours; at Gibraltar 33 inches in 26 hours; on the hills above Bombay 24 inches in one night; and on the Khasi Hills 30 inches on each of five successive days.

In all places within the tropics where the trade-winds are blowing regularly and steadily, rain is rare; the reason being that, as these winds come from higher latitudes, their temperature is increasing; hence they are

in the condition of taking up moisture rather than of parting with it; and the return trade-winds, which blow above them in an opposite direction, having discharged the greater part of their moisture in the region of the calms, also are dry and cloudless. Where, however, these winds are forced up mountain ranges in their course, as on the e. of Hindustan, they bring rain, which falls chiefly during night, when the earth's surface is coolest. The region of calms is a broad intertropical belt about 5° in breadth, characterized by calms, and toward which the n. and s. trades (see WINDS) blow. This, the region of calms, is at the same time the region of constant rains. Here the sun almost invariably rises in a clear sky; but about midday, clouds begin to gather; and in a short time the whole face of the sky is covered with dense black clouds, which pour down prodigious quantities of rain. Toward evening the clouds disappear, the sun sets in a clear sky, and the nights are serene and fine. The reason of this daily succession of phenomena in the belt of calms is, that there the air, being heated to a high degree by the vertical rays of the sun, ascends, drawing with it the whole mass of vapor which the trade-winds have brought with them, and which has been largely added to by the rapid evaporation from the belt of calms; this vapor is condensed as it is raised toward the line of junction of the lower and upper trade-winds, and the discharge is in some cases so copious, that fresh water has been collected from the surface of the sea. As evening sets in, the surface of the earth and the superincumbent air are cooled, the ascending currents cease, the cooled air descends, and the dew-point is consequently lowered, clouds are dissipated, and the sky continues clear till the returning heat of the following day brings round a recurrence of the same phenomena. Since the belt of calms, which determines the rainy season within the tropics, moves northward or southward with the sun's declination, carrying the trade-winds with it on each side, it follows that there will be only one rainy and one dry season in the year at its extreme n. and s. limits; but at all intermediate places, there will be two rainy and two dry seasons—at the equator these will be equally distant from each other.

This state of things is of strict application only to the Pacific Ocean, whose vast expanse of water, presenting a uniformly radiating and absorbing surface, is sufficient to allow the law to take full effect. But over the greater part of the earth's surface disturbing influences draw the trade-winds more or less out of their normal course, and sometimes produce a total reversal, as in the case of the Monsoons (q.v.). These winds determine entirely the rainfall of India, and but for them the e. districts of Hindustan would be constantly deluged with rain, and the w. parts constantly dry and arid. As it is, each part of s. Asia has its dry and wet season, summer being the wet season of the w. parts and interior as far as the

Himalaya, at Darjeeling, during the wet season of the s., especially s.e. parts.

The heaviest annual rainfall on the globe is 527 inches, at Cherra Punji, on the Khasi Hills, 494 inches of which falls from Apr. to Sep. during the s.w. monsoon. This astonishing amount is due to the abruptness of the mountains which face the Bay of Bengal, from which they are separated by 200 m. of low swamps and marshes. The winds not only arrive among the hills heavily charged with the vapor absorbed from the wide expanse of the Indian Ocean, but being near the point of saturation, their temperature not being raised in passing over these swamps, they are ready to burst in torrents over the abrupt cliffs which divert them from their horizontal course into the higher regions of the atmosphere. At 20 m. inland, the annual fall is reduced to 200 inches; 30 m. further s., it is only 100 inches; n., at Gowhatty in Assam, it is only 69 inches. In the n.w. of the Bay of Bengal, at Cuttack, it is only 52 inches; [illegible] owing to the s.w. direction of the winds, it is 200 to 240 inches. At Madras the annual fall is 48 inches; at Seringapatam only 24 inches; at Bombay 71 inches; at Poona 26 inches, and at Mahabaleshwar 254 inches, both on the W. Ghauts; and at Poona inland 27 inches. The s.w. monsoon discharges 20 to 40 inches of rain over the parts of Hindustan not bounded by high mountains on the w., before reaching the Himalayas, after which it discharges the greater part of its moisture, 120 to 140 inches, on the outer Himalaya ridge, at elevations of 4,000 to 8,000 ft. Thus, four times more rain falls annually on the Khasi Hills than on the Himalaya, owing to the less abrupt face which the Himalaya present to the s., to the sandy burning plains [illegible] winds considerably above the dew point, and to the larger tract traversed by the winds, over which their moisture continues to be discharged as they pass.

The following are a few of the annual rainfalls in the tropics, &c.: Singapore 97 inches; Canton 78 inches; St. Benoit (Island Bourbon) 183 inches; Sierra Leone 126 inches; Caracas 145 inches; Pernambuco 106 inches; Rio de Janeiro 45 inches; Georgetown 95 inches; Barbadoes 50 inches; St. Domingo 107 inches; Bahamas 55 inches; Vera Cruz 183 inches. In many places in the interior of continents within the tropics, the rainfall is small—not greater, in fact, than in temperate countries such as e. England. At Poona, only 23 inches fall annually.

The periodicity of the rainfall disappears as we recede from the tropics, and the times of the year during which it occurs are different—the greater quantity falling in summer at places within the tropics and in the interior of continents, but in winter in countries bordering on the sea in temperate regions. In respect of the rainfall, Europe may be divided into two distinct regions: w. Europe, and the countries bordering on the Mediter-

ranean. A vast ocean on the one hand, a great continent on the other, and a predominance of w. winds, are the determining circumstances in distribution of rainfall over w. Europe. As the s.w. winds, which are the return trades, descend to the earth and blow over the surface of Europe, and as the whole of this continent is thus within their influence, it follows that the w. parts, especially where mountain ranges stretch n. and s., are rainy districts; for these mountains, diverting the s.w. winds from their horizontal course, force them up into the higher regions of the atmosphere, where, chilled, they form into clouds, or deposit in rain the vapor that they can no longer hold in suspension. Hence the rainiest regions of Europe are Norway, Ireland, the west of Great Britain, and of France, Spain, and Portugal. In the w. of Great Britain and Ireland, in the vicinity of high hills, the average rainfall is 80 to 128 inches. At Bergen, in Norway, it is 70 inches; in the Peninsula, at Oporto, 54 inches; at Bilbao 47 inches; at St. Jago 65 inches; and in France it is 51 inches at Nantes, and 49 at Bayonne. At places at some distance from hills, and in more inland districts, the annual fall is much diminished. Thus, in the w. of Great Britain, away from hills, it is 30 to 45 inches; while in the e. it is 20 to 28 inches. In France it averages 30 inches; in the plains of Germany and Russia 20 inches; while in parts of Sweden and Russia it falls as low as 14 inches. In the interior of Europe, in mountainous districts, it rises much above these amounts—e.g., at Ischl it is 62 inches. An important distinction between the mode of distribution of rainfall in w. Europe and that of more inland places is, that the greater part of the annual amount in the west falls in winter; but in the interior, in spring or summer. This difference is particularly striking on the different sides of Great Britain, and arises from the fact that, as the clouds are much lower in winter, they are arrested and drained of their moisture by the less elevated hills, leaving little to be deposited eastward; but in summer, being high, they pass above, and discharge themselves in the interior. Thus, for every 10 inches of rain which fall at the following places in winter, there fall in summer respectively 8½ inches in the w. of Great Britain, 11 inches in the e. of Great Britain and w. of France, 15 inches in the e. of France, 20 inches in Germany, and 27 inches in the n. and e. of Russia.

The peculiarity of the rainfall of the basin of the Mediterranean depends on its proximity to the burning sands of Africa, a predominance of northerly winds, and the position of the Pyrenees and Spanish sierras to the w., on which the s.w. winds discharge their rains before arriving on the n. shores of the Mediterranean. In the valley of the Rhone, four times more rain falls in autumn than in summer; and s. of the Alps, six times more rain falls with the n.e. than with the s.w. winds, being the reverse of what takes place in England. In Italy, the quantity diminishes as we approach the south. On the

coasts of the Mediterranean, it rarely rains in summer, but frequently in winter. In the valley of the Rhone, the annual fall ranges from 20 inches at its mouth to 63 inches at St. Rambert, the average being 30 inches. This is the average also of the valley of the Po; but on ascending to the Alps, it increases, as at Tolmezzo, to 96 inches.

The rainfall in the w. of the American continent is distributed similarly to that of Europe—the amount being dependent on the physical configuration of the surface over which the westerly winds blow. The yearly amount increases as we proceed northward; thus, at San Francisco 21 inches; at Fort Reading 29 inches; at Fort Oxford 72 inches; at Fort Vancouver 47 inches; at Astoria 86 inches; at Steilacoom (Wash.) 54 inches; and at Sitka, in Alaska, 82 inches.

But in the United States, the manner of the distribution of rain is very different from that of Europe. The United States depends for rain not on the Pacific Ocean, but on the Gulf of Mexico. There can be little doubt that, but for the high range of the Rocky Mountains in Central America, the greater part of the states would be an arid waste. These mountains are so high as to present an effectual barrier to the passage of the trade-winds, which blow over the Gulf of Mexico; they are, on this account, turned northward, and spread themselves over the states, especially over the low basin of the Mississippi. These winds being characterized by great heat, and loaded with much moisture from the warm waters of the Gulf of Mexico, tend to disturb the statical equilibrium of the atmosphere. When they have blown for some time, vast accumulations of heat and moisture take place, the equilibrium is destroyed, and a great storm arises in consequence, sweeping eastward over the states, and in many cases crossing the Atlantic, and descending with violence on w. Europe. In the states, the southerly winds preceding the storm give place to the dry n.w. winds, which rapidly clear the sky, and bring brilliant bracing weather in their train. It appears, in short, that the s. winds from the Gulf of Mexico spread the moisture over the states, and the n.w. wind disengages this moisture from them by coming in below them, because of their greater density, and thrusting them into the higher regions of the atmosphere. If this be the case, as the phenomena indicate, then the heaviest rainfalls will be in the valleys, and the least on the higher grounds—a mode of distribution quite different from that prevalent in Europe. Thus, the greatest amount of rain falls in Fla., the low flats of the Mississippi, then along its valley, and lastly in Iowa, or in that remarkable depression at the head of the river; and the least quantities on the Alleghanies, especially on their higher parts, and on the high grounds of the Missouri district. The following figures, giving the average annual amount in inches, show this in clear light: Pensacola 57; Fort Brooke 55; and Fort

Pierce 63—in Fla.: Monroeville 66; Mobile 64—in Ala.: Natchez 58; Jackson 53—in Miss.: Rapides 68; New Orleans 52—in La.: Savannah 48—in Ga.: Nashville 55—in Tenn.: Dubuque 33—in Iowa. At Athens, Ga., s. of the Alleghanies, the amount is 36 inches: at Alexandria, Va., also 36 inches; and at Jefferson, Mo., 38 inches. In the northern states, the quantity diminishes at most places to between 27 and 45 inches, and the mode of its distribution becomes assimilated to that of Europe.

When raindrops fall through a stratum of air below 32°, they become frozen, and form *Hail* (q.v.). When the vesicles are formed in air under 32°, *Snow* (q.v.) is the result.—See METEOROLOGY, and references under it.

RAIN´BOW: arch of colors formed in the sky by refraction and reflection of rays of light falling on watery particles in the part of the sky opposite to the sun. The ordinary phenomena of the R. are usually visible on every occurrence of a 'sunny shower,' and we need not describe them particularly until we deduce them, one after another, from their cause. The most careless observation shows us that, for production of a R., there must be a luminous body of moderate angular diameter, and *drops* of water: for it is never seen except by direct sun or moon light, and never in a cloud unless rain be falling from it. Now, a falling drop of water takes, by its molecular forces, a *spherical* form. Also, as there is separation of the various colors of which white light is composed, the cause of the phenomenon must involve *Refraction* of Light (q.v.), because by Reflection (q.v.) these colors are not separated. But, again, the spectator who views the R. has his back to the sun, and rays of light merely refracted by a raindrop could not be thus sent back to the spectator. The phenomenon must therefore depend on successive reflections and refractions, and we shall investigate in an elementary manner what appearances we ought to *expect* as the result of such processes according to the known laws of optics; merely premising that the fundamental points of the explanation were given first by Newton in the second book of his *Optics*.

First, then, let us consider what becomes of parallel rays of light, *of one color* or refractive index (see REFRACTION), which are successively refracted and reflected in a single spherical raindrop.

For our immediate purpose, it is sufficient to suppose that the refractive index (see REFRACTION) of water is $\frac{4}{3}$; that is, the incident and refracted rays make with the perpendicular, to the refracting surface of water, angles whose sines are in the ratio of 4 to 3.

Let the circle represent a section of the drop made by *any* plane passing through its centre O, and the line SO, which joins its centre with the sun; the sun being supposed, for the moment, to be a single luminous point, situated at so great a distance that lines drawn to it from different points of the drop are parallel. A ray of light, SB, falling on the drop in the plane of section, will

be, of course, partly reflected and partly refracted at B. The reflected part does not concern us, as in it all colors would travel together; in fact, the result of reflection from the external surfaces of the drops is simply to illuminate the background feebly. Join OB, and produce it to Q: then the refracted ray (see REFRACTION) will have in the drop the direction BA, where the ratio of the sines of SBQ and OBA is the refractive index of water—i.e., 4:3 nearly. Arriving at A, the ray will be partly refracted in some such direction as AD, and the rest reflected in the direction AC. Now AD obviously cannot fall on the eye of a spectator whose *back* is turned to the sun, and it has, therefore, nothing to do with the rainbow. The internally reflected ray, AC, on reaching the surface at C, is partly refracted in the direc-

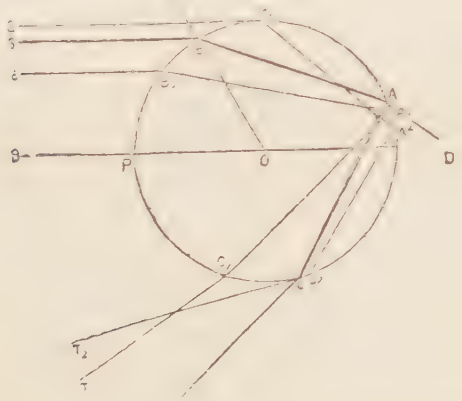


Fig. 1.

tion CT (where BS and CT are symmetrically situated on opposite sides of OA), and partly reflected internally. The latter portion we must consider when we come to the cause of the *secondary* or outer rainbow; the former is that which at present concerns us. Let SB_1, SB_2, be other incident rays. After a refraction, a reflection, and a second refraction, they emerge in the directions C_1T_1, C_2T_2, respectively. From the figure, which is drawn from calculation, it is obvious that both C_1T_1 and C_2T_2 are *less* inclined to OS than CT is. Hence for rays, parallel to SO, falling on the drop, and emerging after suffering two refractions and a reflection, the *final* direction is more and more inclined to SO, as the point of incidence, B_1, is further from P, at least up to some such point as B; after which (for points situated as B_2) it diminishes again. By proper mathematical methods, it is easy to find that the angle SOB is about 59° 24′, if the

refractive index be $\frac{4}{3}$. Now, by a general property of maxima or minima in optics (see CAUSTIC), the rays falling on the drop near to B will emerge nearly parallel to CT; while those incident near any other point (as B_1) will be widely scattered at emergence. And we may evidently extend this reasoning to all other rays by supposing the above figure to rotate about the axis SO.

The conclusion is, therefore, that if homogeneous light fall in parallel lines on the spherical drop, those rays which have been *twice* refracted at the surface, and *once* internally reflected, will, on emergence, all lie within the cone formed by the revolution of CT about SO, and will be *condensed* toward the surface of that cone. Hence such an illuminated drop gives off by this particular process a solid cone of rays, much condensed toward its external boundaries.

So much for each drop. Next, let us inquire what the

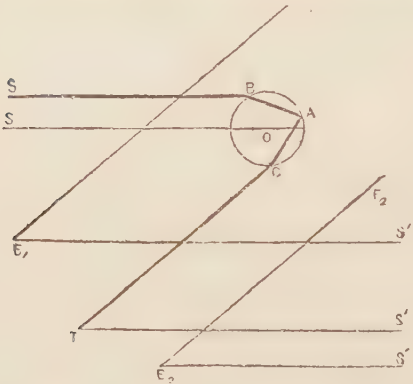


Fig. 2.

appearance will be to an eye in any given position. Referring to the next figure, in which the letters are the same as in the former, draw TS′ parallel to SO: then TS′ is the direction of the line drawn to the point on the heavens diametrically opposite to the sun. So are E_1S_1' and E_2S_2', drawn from any assumed positions, E_1 and E_2, of the spectator's eye.

If the eye be placed in the surface of the cone just described, as at T, it will receive the condensed ray which emerges in the direction CT; if at E_1 (within the cone), it will receive diffused rays from the drop; if at E_2 (outside the cone), it will receive no light at all.

To put this in simpler form: Draw E_1F_1 and E_2F_2 parallel to TC: then evidently we may say that the eye receives a condensed light from any drop whose angular distance from the point opposite the sun is CTS′, a diffused light if the angular distance be less than this, and none at all if it be greater. By methods above

added to, it is found that CTS is nearly 42° 12′ for the index of refraction $\frac{4}{3}$.

Hence, if the sun were a luminous point, emitting homogeneous light whose index of refraction in water is $\frac{4}{3}$, a spectator looking through a shower of falling raindrops, toward the point immediately opposite to the sun, would see a bright circle of angular diameter 84° 24′ surrounding this point, diffused light within that circle, and darkness without it.

The effect of the finite angular diameter of the sun is evidently to widen this circle into a circular luminous band, whose breadth is the sun's apparent diameter, and whose mean radius is 42° 12′.

Next, let us consider the different refrangibilities of the colored constituents of white light. The investigation above outlined shows that the radius of the luminous circular band is greater, the less the refractive index; the proof, though very simple, would be out of

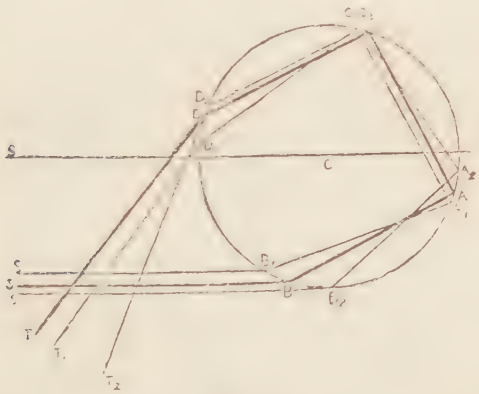


Fig. 3.

place here. Hence the appearance actually observed with sunlight will be formed by the superposition of concentric, overlapping, circular bands, the radii being less and less as we consider the primary colors in the order from red to violet (see SPECTRUM). That is, we shall have a circular illuminated space, brightest toward the edge, with a homogeneous red ring as its external boundary, and a gradual mixture of the prismatic colors as we look nearer to the centre. This agrees very well with observation, and so do the calculated diameters of the external red (42° 22′) and internal violet (40° 35′) rings.

But what becomes of the light *twice* reflected inside the drop, and then refracted out? Let fig. 3 represent again a section of the drop, with sunlight falling on it in lines parallel to SO, and let us trace the course of one ray, as SE. The part reflected at B is to be dis-

posed of as before; it goes merely to illuminate, feebly, the otherwise dark background of cloud and vapor. The refracted portion proceeds, as before, to A, where part is reflected internally along AC, and part refracted out. The latter portion, as we have seen, cannot possibly reach the eye of a spectator whose back is turned to the sun. Similarly, at C, there is internal reflection along CD, and refraction out of the drop. The refracted part has already been considered, as the cause of the *primary* rainbow. The reflected part will again at D be separated into two; one, reflected internally, which proceeds to form the tertiary and higher orders of bow; and the other, escaping from the drop in the line DT, which goes to form the *secondary* bow. This we will consider with some care, because the secondary bow, though necessarily fainter than the primary, is usually seen; the tertiary and higher bows, each much fainter than the preceding one, since the beam inside the drop is weakened at each succeeding reflection, require no notice, as even the tertiary has never been observed in nature.

As before, we have traced the courses of two other beams, SB_1 and SB_2, in their passage to form part of the secondary bow. They are respectively $SB_1A_1C_1D_1T_1$ and $SB_2A_2C_2D_2T_2$; and the figure shows that the final rays D_1T_1 and D_2T_2 are each *more* inclined to SO than DT is. There is, therefore, a particular ray, SB, whose final direction, DT, is *less* inclined to SO than that of any other ray which has suffered two refractions and two internal reflections; and, as before, the emergent light is condensed toward this minimum. If, then, the figure be made to revolve about SO, we see that DT will describe a cone, that *inside* this cone there is no refracted light, that, toward the surface of the cone, part of the light is condensed, and that the rest of it is diffused through *exterior* space.

So much for one drop; let us now, as before, consider what will be seen by an eye in any position with regard to this particular drop. In fig. 4, the letters denote the same things as in fig. 3. Hence, if the eye be placed at T, it will receive the maximum of light, in a direction making an angle DTS′ with the point in the heavens opposite to the sun. If at E_1, it will receive some of the diffused light from a drop whose angular distance from the point opposite the sun is *greater* than DTS′; and if at E, it will receive no light at all, the drop's angular distance from the point opposite the sun being *less* than DTS′. Hence the appearance presented by a shower of drops is, for homogeneous light coming in parallel lines, a bright circle, whose angular radius is DTS′; diffused light outside that circle, and no light within it. When the light comes from a source of finite angular diameter, as the sun, the only effect is, as in the primary bow, to *widen* the bright circular band. When we consider the various components of white light, calculation shows that DTS′ is least for red, and greatest for violet. Hence

we have a series of concentric colored bands superposed, their diameters increasing from the red to the violet. Hence the secondary rainbow has its inner edge red, and its outer violet. The interior dark space being an exceedingly mixed or impure Spectrum (q.v.). The results of geometrical optics show that the angular diameter of the red is 100° 48′, and of the violet 106° 44′; so that the breadth of the bow is 3° 30′ nearly.

In nature, these rough results are nearly verified; but more profound investigation into the circumstances of the problem shows some modifications. In the first place, we find that for each kind of homogeneous light the actual maximum of brightness is in a circle of rather less angular diameter than that given by the more ele-

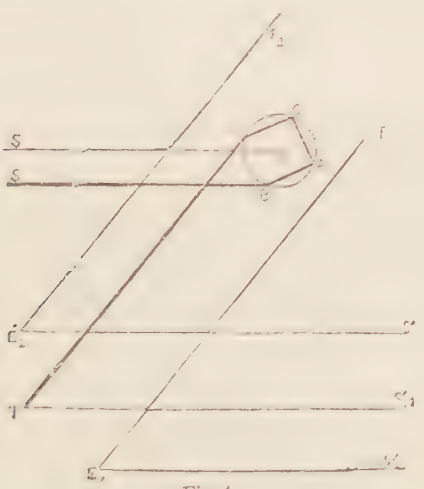


Fig. 4.

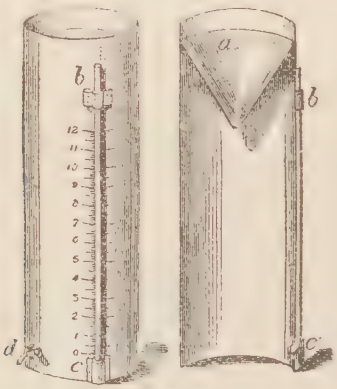
mentary investigation for the primary bow; and rather greater for the secondary. Secondly, and still with homogeneous light, there is a succession of feebler and feebler concentric circles of maximum brightness—inside the principal maximum in the primary bow, and outside it in the secondary. These give rise to what is always seen in a fine rainbow, the so-called *spurious* or *supernumerary* bows, lying close inside the violet of the primary bow, and outside that of the secondary. These are fainter and more impure as they proceed from the principal bow, and finally merge into the diffused white light inside the primary bow, and outside the secondary.

The angular dimensions of these bows, principal and spurious, were calculated from theory by Airy, and carefully measured by Müller in the artificial bow formed by passing light through a very fine column of water

descending through a small aperture, and the accordance was perfect.

The lunar rainbow, a comparatively rare but very beautiful phenomenon, differs from the solar simply in the source and intensity of the light by which it is produced; and, as in all cases of feeble light, the distinction of the colors is very difficult. In fact, except under most favorable circumstances, the lunar rainbow rarely shows colors at all, giving a pale, ghostly gleam of apparently white or yellow light.

RAIN'-GAUGE: instrument for ascertaining the amount of rain which falls at any given place. Rain-gauges are of various constructions. The simplest is that which consists of a metallic cylinder, from the bottom of which a glass tube (*bc*), divided into inches and parts of an inch, projects upward. It is provided with a funnel, inserted within at the top, to prevent evaporation, and the rain-water is emptied out by means of a stop-cock (*d*) at the bottom, or, still simpler, by a hole (*a*) pierced in the funnel at the top. (See accompanying cut.) As this form of gauge is objectionable on account of the frequent breakage of the glass tube by frost, a float is used instead, which is raised by



Rain-gauge.

the water, and a scale is attached to it, to show the quantity of rain received. As this gauge does not admit of very nice readings, another sort is frequently employed—viz., a receiving-vessel and a glass measure of much smaller diameter, which thus admits of as nice graduation as may be desired. As, practically, there is often great difficulty or trouble experienced in replacing the glass measure when it chances to be broken, the late G. V. Jagga Rão, a wealthy zemindar of Vizagapatam, India, proposed a gauge in the form of a funnel, having a diameter of 4·697 inches, or an area of 17·33 sq. inches. Now, as a fluid ounce contains 1·733 cubic inches, it fol-

lows that, for every fluid ounce collected by this gauge, one-tenth of an inch of rain has fallen. This measure can, of course, be graduated to any degree of nicety, and may be reproduced at pleasure. It has also the merit of being by far the cheapest gauge, costing perhaps $1.25. Expensive self-registering rain-gauges have been invented by Osler, Crossley, and Beckley.

A most important point with regard to the rain-gauge is its height above the ground. Prof. Phillips found the fall of rain at York, England, for 12 months 1833–4, to be 14·96 inches at a height of 213 ft. from the ground; 19·85 inches at 44 ft.; and 25·71 inches on the ground. This remarkable fact—viz., that different quantities are collected at different heights, the amount being always greater at the lower level—has been confirmed wherever the experiment has been made. No perfectly satisfactory account has yet been given of this singular phenomenon. The condensing of the vapor of the atmosphere on the surface of raindrops as they fall—the rebound of the finer particles into which many of the drops break themselves as they strike with violence on the ground—and the eddies and currents which prevail most and strongest around isolated objects raised above the surface of the ground, to a large extent account for the phenomenon. Of these three, the greatest importance is to be assigned to the last two; and this is confirmed by the fact that a gauge placed on the roof of a building that happens to be flat, of considerable area, and with few or no chimney-stalks to disturb the air-currents, collects an amount equal to that collected at the same place by a gauge on the ground. The proper size and shape of the rain-gauge, and its height above the ground, so as to measure with the greatest exactness possible the real quantity of rain that falls, are still debated. There are pluviometers or rain-gauges that indicate the duration of rainfall by marking the raindrops on a chemically sensitized plate; and there is a 'self-registering' R. which, by means of a float, rod, and spring pencil or pointer, marks the duration and quantity of rainfall by tracing a line on a revolving drum with diagram sheet.

RAINSFORD, *rānz'ford*, William Stephen, D.D.: Prot. Episc. clergyman: b. Dublin, Ireland, 1850, Oct. 30. He was graduated at Cambridge, England, 1872; was curate at Norwich 1872–76; asst. rector of St. James's Cathedral, Toronto, Canada, 1878–82; and since 1883 he has been rector of St. George's, New York. Besides many contributions to the periodical press, he published a vol. of *Sermons* (1887). Dr. Rainsford has publicly verified his liberal spirit by inviting ministers of other denominations to make addresses in his church. His church is thoroughly organized for a wide range of beneficent work, which it prosecutes at large annual cost, and for which it has a complete provision in buildings and equipment.

RAIN'Y LAKE: portion of the boundary line between the United States and British N. America; 160 m. w. of Lake Superior, 1,160 ft. above sea-level; about 35 m. long, and 5 m. in average breadth. Its surplus waters are carried off to the Lake of the Woods, in a w.n.w. direction, by the Rainy river, about 100 m. in length, whose banks are covered with pine forests.

RAI SANYO: historian: 1780–1833; b. Japan. His works hold the highest rank among the histories of Japan, and were influential in forming the public sentiment which led 1868 to the overthrow of the Shoguns and the abolition of the dual form of government. His *Nihon Guaishi* (22 vols.) gives the milit. history of the country from the 12th to the 17th c., and traces the rise of the Shoguns, or Tycoons, and their gradual usurpation of power. To obtain materials for this great work, he consulted more than 650 Japanese books, many of which were in a large number of volumes. Parts of this history have been translated into English. His other history of Japan, from A.D. 600 down to the close of the 16th c., was published after his death.

RAISE, v. *rāz* [Goth. *raisjan*, to raise: Icel. *reisa*, to excite, to raise]: to cause to rise; to elevate from low to high; to lift up; to elevate; to promote; to erect or build; to set up; to utter loudly; to advance or prefer; to increase, as the price or the voice; to arouse or stir up; to call into view from the state of spirits; to bring from death to life; to collect or obtain, as a sum of money; to occasion or begin; to cause to grow; to cultivate; to cause to swell; to ordain or appoint; to assemble or levy; to make porous; to leaven; to procure; to propagate; in *OE.*, to amplify; to enlarge. RAIS'ING, imp.: N. the act of lifting or setting up; in *Amer.*, the operation or work of setting up the frame of a building. RAISED, pp. *rāzd*. RAISER, n. *rāz'ėr*, one who raises. TO RAISE A BLOCKADE, to terminate a blockade, by the forces or the ships that make it either removing voluntarily, or by their being driven away. TO RAISE A PURCHASE, among *seamen*, to dispose mechanical agents in such a way as to exert the force required. TO RAISE A SIEGE, to relinquish, on the part of the besieging force, the attempt to take a place, or to drive away from besieging it. TO RAISE THE WIND, to obtain money by any means.—SYN. of 'raise': to exalt; elevate; hoist; erect; lift; heave; produce; excite; stir up; rouse; aggravate; cause; heighten; originate; build up; occasion; begin; set up; collect; assemble; levy.

RAISED SEA-BEACHES: see BEACHES, RAISED.

RAISINÉE, n. *rā'zin-ā'*: a sweetmeat esteemed in France, made by boiling new wine, and skimming until only half the quantity of wine remains, after which it is strained; apples, pared and cut into quarters, are added, and it is allowed to simmer gently, till the apples are thoroughly mixed with the wine, when it has a pleasant sweetish acid taste. Cider may be used instead of wine.

RAISINS, n. *rā'zinz* or *rāz'nz* [F. *raisin*; Prov. *razim razain*, a grape: Sp. *racimo*, a bunch of grapes: L. *racēmus*]: dried grapes, prepared by two different methods. One method consists in partially cutting through the stalk of the ripened bunches and allowing them to shrink and dry on the vine by the heat of the sun. These are by far the better sort, and are called *Raisins of the Sun*, or Muscatels. Malaga is famed for its sun-raisins, which are the finest in the world. The raisins prepared by the other method are called *Lexias*, and are gathered and hung on lines, or laid on prepared floors, to dry in the sun. When dried, they are dipped in a hot *lye*, made by dissolving the alkali out of wood-ashes or barilla with water, until the filtered fluid has a specific gravity of about 1·100; to this is added, for every four gallons, a pint of olive-oil and a quarter-lb. of salt. After dipping, the fruit is laid on hurdles of wicker-work to drain, and is continually exposed to the sun for about a fortnight. The raisins are then pulled from the stalks, and packed into boxes for transport to other countries. The qualities best known in the markets are Valencias and Denias from Spain, Malagas from Malaga, and black Sultanas and Sultanas from Asiatic Turkey. The ravages of the *phylloxera* in France have led to an immense importation of raisins from the East (to Marseilles chiefly), for manufacture of wine: see WINE. The Currant (q.v.) is only a small variety of grape.

RAISONNÉ, a. *rā-zō-nā'* [F.]: supported by proofs, arguments, or illustrations; arranged and digested systematically, as a catalogue *raisonné*.

RAJ, n. *rāj* [Skr.]: in *India*, a government; rule; reign; as, the Eng. *raj* in India, the native *raj*.

RAJAH, n. *rā'jâ* or *rā'jā* [Skr. *rajan*, a king: comp. L. *rex* or *rēgem*, a king]: in *Hindustan*, originally a title which belonged to those princes of Hindu race who, either as independent sovereigns or as feudatories governed a territory; it then became a title given by the native governments, and, in later times, by the British govt., to Hindus of rank; and it is now frequently assumed by the zemindars or landholders, the title Maha rajah, or 'great rajah,' being, in these days, generally reserved to the more or less independent native princes. According to the ancient social system of India, the rajah belonged to the Kshatriya or military caste (see CASTE); now, however, the title is given to, and assumed by, members also of an inferior caste. RA'JAHSHIP, n. the dignity or territory of a rajah. RAJPUT, or RAJPOOT, n. *rāj-pōt'* [Skr. *raja-putra*, offspring of a king]: in *India*, a Hindu of the higher military tribe or order (see RAJPUTS). RAJA ADHIRAJA, king of kings.

RAJAMAHENDRI, *râ-jâ-mă-hĕn'drĭ*, or RAJAMUNDRY, *râ-jâ-mŭn'drĭ*: town of Hindustan, cap. of the dist. of Godavari, in the presidency of Madras; on the left bank of the Godavari, about 50 m. from its mouth; long. 81° 53′ e. North of the town is the Fort, a square edifice, comprising the barracks, hospital, jail, and magazine. The larger kind of game, as well as wild-fowl of all sorts, abounds in the vicinity, and the situation and scenery are very beautiful. The Godavari, here about two m. wide, is crossed by a steam-ferry. Napkins and table-cloths are manufactured. Pop. (1881) 24,555.

The *district* of Godavari, of which R. was formerly the capital, and is still seat of the courts, has 7,345 sq. m. Pop. (1881) 1,791,512—almost entirely Hindus in faith.

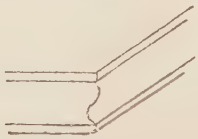
RÂJATARANGIN'Î (or 'the river of kings,' from Skr. *râjan*, king, and *tarangin î*, river or stream): name of four chronicles of the history of Cashmir written in Sanskrit verse: the first, by *Kalhan'a*, bringing the history of Cashmir to about A.D. 1148; the second, continuation of the former, by *Jonarâja*, to 1412; the third, continuation of the second, by *S'rîvara*, pupil of Jonarâja, to 1477; and the fourth, by *Prâjyabhat't'a*, from that date to the conquest of the valley by Emperor Akbar. Of these chronicles, only the first has much repute, inasmuch as it is the most important and complete of all *known* Hindu chronicles, and is considered the only surviving work of Sanskrit literature which makes attempt at historiography. Its author, the pandit Kalhan'a—of whom we know only that he was son of Champaka, and lived about 1150 under the reign of Sinhadeva of Cashmir—reports that, before entering on his task, he had studied 11 historical works, and a history of Cashmir by the sage Nila, also that he had examined old documents—grants and proclamations by kings, texts of laws, and sacred books. It is presumed, therefore, that his account is trustworthy as regards the last few centuries preceding him; but the uncritical disposition of the Hindu mind regarding historical facts, especially those religious or legendary—besides the writer's bias to produce a consistent system of chronology—casts great doubt on all in his work that relates to the ancient history of India. Still, he is our only source of information regarding much of the history of Cashmir. Kalhan'a begins with the mythological history; the first king named by him is Gonarda, who, in his chronology, reigned B.C. 2448; and the last mentioned by him is Sinhadeva, about A.D. 1150. The Skr. text of all four Râjatarangin'îs was edited at Calcutta 1835, under the auspices of the Asiatic Soc. of Bengal.—See also H. H. Wilson, *An Essay on the Hindu History of Cashmir*, in *Asiatic Researches*, XV.; and Lassen's *Indische Alterthumskunde*, I., 1a.

RAJMAHAL, *rāj-mā-hāl'*: town of India, dist. of Bhagulpore, Bahar, Lower Provinces of Bengal; a station on the railway from Calcutta to the n.w. frontier: on a steep eminence on the right bank of the Ganges, 200 m. by land n.n.w. of Calcutta. Its position is advantageous, and it was long the chief town of the Bengal and Bahar provinces. Since the removal of the British courts of justice, it has declined, and is deserted and ruinous, though noteworthy for the remains of its splendid palace, and for its important transit-trade. Its people are employed mostly in providing for the vast number of travellers who pass through the town by land and water, and the pop. has declined from 70,000 to 3,839 (1891).

RÂJPUTS, or RÂJPOOTS, *rāj-pōts'* [from Skr. *rājan*, king; *putra*, son; literally, 'sons of kings']: name of various tribes in India, of Aryan origin, descended either from the old royal races of the Hindus, or from their Kshatriya or warrior caste (see CASTE). At all periods they seem to have been conspicuous in the history of India; and all over Hindustan are many families who, rightly or wrongly, claim the title Râjputs. At present, they occupy chiefly the country known as Râjasthân or Râjputana, including, among other states, Mewar, Marwar, Jeypur, Bikanir, Jessulmir, Kotah, and Bundi. Before the invasion of Mahmûd the Ghiznevide, four great kingdoms were under the dominion of Râjput families—viz., Delhi, Kanoj, Mewar, and Anhulvarra; and all the kings mentioned in the *Râjatarangin'î* (q.v.) of Kalhan'a were of Râjput origin.—For the history, etc., of the R., and the geography of Râjputana, see Col. James Tod's *Annals and Antiquities of Râjasthân, or the Central and Western Râjpoot States in India* (2 vols., Lond. 1829); Ritter's *Erdkunde*, VI. 724, ff.; Lassen's *Indische Alterthumskunde*, I., II. (*passim*); A. Troyer's *Radjatarangini*, t. III. (*Notes critiques*, etc.).

RAKE, n. *rāk* [Sw. *raka*, to riot about: Icel. *reika*, to rove about: Scot. *raik*, to rove, to wander at large]: a loose, disorderly, idle fellow; a man addicted to lewd and vicious acts: V. to gad or ramble idly; to lead a dissolute life. RA'KING, imp. RAKED, pp. *rākt*. RAKISH, a. *rā'kish*, loose; wanton; dissolute. RA'KISHLY, ad. *-lĭ*. RA'KISHNESS, n. *-nĕs*, dissolute practices.

RAKE, n. *rāk* [Gael. *rac*, to rake: Icel. *raka*, to scrape: F. *racler*, to rasp or grate: Ger. *rechen;* Dut. *ræckelen*, to rake]: agricultural and horticultural implement, in use from very ancient times; resembling a large comb. In its simplest form it consists merely of a bar of wood or iron, with wooden or iron teeth inserted into it, and attached at right angles across the end of a long handle. It is used for collecting straws, hay, etc., from a field after it has been reaped or mown; or for gathering stones from newly tilled ground; sometimes also in gardens, for covering seeds. A long rake, with a short triangular framework instead of a handle, and curved teeth, called the *ell-rake*, is much used in hay-fields in England. Rakes are also adapted for being drawn by horses; and there are modifications both of the hand-rake and of the horse-rake. Among *seamen*, *rake* is a term for 'slope,' as a mast, etc.; the inclination of a mast of a ship from the perpendicular to the keel, so that the angle which it makes with the keel, toward the stern, is less than a right angle: in *mining*, a rent or fissure in strata, vertical or highly inclined: in a *ship's bow* or *stern*, all that part of the hull of a ship at the stem and stern which projects beyond either end of the keel: V. to gather or smooth with a rake; to collect or gather together something scattered; to gather with difficulty or labor; in *mil.*, to fire guns in the direction of the length of anything, as at the stern or head of a ship, that the balls (e.g., grape-shot) may pass over the whole length of the deck—nearly the most disastrous thing that can happen to a vessel in action: to scratch into in search of something; to search with eager diligence; to grope. RA'KING, imp.: ADJ. cannonading a ship in the direction of its length. RAKED, pp. *rākt*. RAKER, n. *rā'kėr*, one who or that which rakes; a self-acting contrivance in a locomotive engine for cleaning its grate; a gun so placed as to rake an enemy's ship. RA'KISH, a. *-kish*, applied to the particular appearance of a vessel with its mast sloping toward the stern.—RAKING MOLDING, molding not horizontal or vertical, but sloping at an angle. When joined to a horizontal



Raking Molding.

molding, the raking molding is run so as to mitre with the true vertical profile of the former, and is therefore different from it in section. TO RAKE UP, to cover the ashes over the fire; to bring up or revive, as old quarrels and grievances. LEAN AS A RAKE, in *OE.*, a condition in which the ribs are shown

RAKEHELL, n. *rāk'hĕl* [F. *racaille*, the base and rascal sort: probably connected in origin with RAKE 1]: a profligate; a debauchee. RAKEHELL, or RAKEHELLY, a. *rāk-hĕl'li*, wild; outcast; worthless.

RAKI', or RAKEE': see ARRACK.

RAKO'CZYMARSCH, *râ'ko-tsē-mârsh:* simple and grand military air by an unknown composer, said to have been the favorite march of Francis Rako'czy II. of Transylvania, and known to have been much played in his army. The Magyar Hungarians adopted it as their national march, and it is said to have had in 1848 and 9 the same inspiriting effect on the revolutionary troops of Hungary as the *Marseillaise* on the French. Like the *Marseillaise* in France, it has been placed in Austria under the ban of the govt. at various periods of political excitement. In 1848 several attempts were made by Hungarian poets to set it to appropriate verses, but without much success. The air most generally known in Germany and elsewhere as Hungarian is the Rako-czymarsch, which is introduced by Hector Berlioz in *Damnation de Faust*, is a weak paraphrase of the original, by Ruziczka.

RA'KOS: see PESTH.

RAKSHAS, *râk'shas*, or RAKSHASA, *râk'sha-sa:* in Hindu mythology, a class of evil spirits or demons, sometimes imagined as attendants on Kuvera, god of riches, and guardians of his treasures; but more frequently as mischievous, cruel, and hideous monsters, haunting cemeteries, devouring human beings, and ever ready to oppose the gods and to distress pious people. They have the power of assuming any shape, and their strength increases [illegible] according to [illegible]. In the legends of the *Mahâbhârata*, *Ramayana*, and the *Purân'as*, they play an important part, embodying the evil principle on earth, as opposed to all that is physically or morally good. Various etymologies have been advanced; but the probable origin of the word *Rakshas*—kindred with the German *Recke* or *Riese* —is from a radical *r'ish* or *rish*, hurt or destroy, with affix *sas;* hence, literally, the destructive being.

RALE, n. *râl* [F. *râle*, a rattling in the throat: Ger. *rassela*, to rattle]: every kind of noise attending the breathing in the bronchia and vesicles of the lungs different from the sound of the breathing in health; also called *rhonchus.*

RALEIGH, *raw'li:* city; cap. of Wake co. and of the state of N. C.; on the Seaboard Air Line and the Southern railway; 148 m. s.-by-w. of Washington. It is nearly the geographical centre of the state, and is in a cotton, corn, and tobacco growing region. The local improvements include gas and electric lights, new water and sewerage systems, and street railways. Among the public buildings are the state capitol, a large grey granite building, in a square of 6 acres of beautiful oaks; United States govt. building, of white marble (cost $400,000); state penitentiary (cost upwards of $500,000); and one of the three

state hospitals for the insane. Among the widely-known educational institutions are the State Agricultural and Mechanical College; Shaw Univ., for colored students (Bapt., opened 1865, coeducational), which 1894 had 23 instructors, 351 students, 1,500 vols. in its library, $20,806 income, and an agricultural and mechanical annex; St. Augustine's Normal School and Collegiate Institute, for colored students (Prot. Episc., opened 1868); Peace Institute (Presb., chartered 1857; St. Mary's School (Prot. Episc., opened 1842); Latta Univ., for colored students; the Raleigh Male Acad. (non-sect., opened 1878); a theol. school and the Leonard Medical School, both connected with Shaw Univ.; state institutions for the white blind and the colored deaf mutes and blind; and 5 public schools. Besides college libraries, there are the library of the state supreme court (founded 1812) and the state library (founded 1822). The periodicals comprise 3 dailies, 9 weeklies, and 2 monthlies. At Chapel Hill, near the city, are the Univ. of N. C., which at end of 1893 had 26 instructors, 405 students, and 29,950 vols. in the library, and Wake Forest College (Bapt., organized 1833), which 1894 had 13 instructors, 207 students, 12,000 vols. in the library, $189,326 in productive funds, and $19,928 income. There are 14 churches for white people and 12 for colored, the Bapt. and Meth. Episc. denominations leading. R. has a large trade in cotton and tobacco, handling about 125,000 bales of the former annually. Its manufacturing interests are important and growing, comprising large railway car and repair shops, 4 iron foundries, 3 cotton mills, a cotton-seed oil plant, agricultural implement works, several planing mills, steam engine works, and clothing, ice, and other factories. Local business was promoted 1895 by 2 national banks (cap. $325,000) and 2 state banks (cap. $145,000). The assessed valuations 1890 were: Real property, $3,102,236; personal, $1,769,007—total, $4,871,243; assessment rate, two-thirds actual value; and the net debt, 1894, Feb. 1, was $209,184. The city was selected as the cap. of N. C. 1792. Pop. (1880) 9,265; (1890) 12,678; (1895) estimated, 15,000.

RALEIGH, Sir WALTER: 1552-1618, Oct. 29; b. at Hayes, on the coast of Devonshire; son of Walter R., of Fardel. In 1566 he was sent to Oxford as a commoner of Oriel College, and, though his residence there was brief, gave token of remarkable ability. Three years later, relinquishing study for adventure, he went to France as volunteer in an expedition in aid of the Huguenots; and some years subsequently he was serving in the Low Countries in a force sent by Queen Elizabeth to assist the Dutch in their patriotic struggle against the Spaniards. In 1578 he made his first venture in the field of activity which through life continued at intervals to attract him, sailing, in conjunction with his half-brother, Sir Humphrey Gilbert, with the purpose of founding a colony in N. America. The expedition was unsuccessful, being roughly handled by a Spanish force; and returned in evil case. 1580-1, R.

held a captain's commission in Ireland, where, in operations against the rebels, he distinguished himself by courage and conduct. Shortly after his return, he seems first to have attracted the notice of Queen Elizabeth, who speedily gave him high place in her favor. A well-known story attributes the commencement of his relations with her to his graceful gallantry in spreading before her his costly mantle as a carpet over a muddy place. For some years he was constant in attendance on the queen, who distinguished him by employing him from time to time in various delicate offices of trust, and by substantial marks of favor. The spirit of enterprise was, however, restless in the man; and 1584, a patent having been granted him to take possession of lands to be discovered by him on the continent of N. America, he fitted out two ships, which soon visited what was afterward, by gracious permission of the Virgin Queen, called Virginia. Next year the beginnings of colonization were made; year after year re-enforcements were sent; and five Virginian expeditions were fitted out 1587. In 1585 at R.'s expense. Elizabeth conferred on R. the honor of knighthood. No immediate good, if we except tobacco, came of the colony; and after some years of struggle, he relinquished his connection with it.

During 1587-8, the country being menaced by a Spanish invasion, R. was actively and responsibly occupied in organizing a resistance, and held command of the queen's forces in Cornwall. In the latter year he shared with new honor in the series of actions which ended in defeat and dispersion of the great Armada, and was thanked and rewarded for his services. In 1592, in consequence of an intrigue, resulting in his private marriage with Elizabeth Throckmorton, one of the queen's maids of honor, he incurred her majesty's severe, though only temporary, displeasure. In his banishment from court, he resorted to those schemes of conquest and adventure in the new world which formed one main dream of his life; and 1595 headed an expedition to Guiana, having for its object the discovery of the fabled El Dorado, a city of gold and gems, whose existence in those regions was then generally credited. Of this brilliant but fruitless adventure, on returning, he published an account. Having been reinstated in royal favor, he held 1596 the post of admiral in the expedition against Cadiz, commanded by Howard and the Earl of Essex, and was admittedly the main instrument of its success. In the year following, he took part in the attack on the Azores by the same commanders. In the court intrigues which ended in the downfall of the Earl of Essex, he after this became deeply involved; and certain points of his conduct—notably the sale of his good offices with the queen in behalf of such of the earl's adherents as would buy them—though easily excused by the current morality of the time, have fixed some stain on an otherwise splendid fame.

With the death of Elizabeth 1603 ends the brilliant

and successful portion of R.'s career. Her successor, James, from the first regarded him with unconcealed suspicion and dislike. He had, besides, made powerful enemies—the principal of whom were Cecil and Howard. His ruin was resolved on, and means were soon found to compass it. He was accused of complicity in a plot against the king; and though no jot of evidence of his being in any way concerned in it was produced at his trial, a verdict was readily procured, finding him guilty of high treason. The language of the prosecutor, Atty.-Gen. Coke, was outrageously abusive: he called R. 'a damnable atheist,' 'a spider of hell,' 'a viperous traitor,' etc. Sentence of death was passed, but James did not venture to execute it; and R. was sent to the Tower, where, for 13 years, he remained a prisoner, his estates being confiscated and made over to the king's favorite, Carr, subsequently Earl of Somerset. During his imprisonment, he applied himself to literary and scientific pursuits—his chief monument in this kind being the *History of the World*, a noble fragment, still notable to the student as one of the finest models of quaint and stately old English style. Certain of his poetical pieces, giving hint of a genius at once elegant and sententious, also are remembered, and are familiar to many. In 1616 he procured his release, and once more sailed for Guiana. The expedition, from which great results were expected, failed miserably. R. himself was prevented by severe illness from accompanying it inland; and nothing but disaster ensued. To add to his grief and disappointment, his eldest and favorite son was killed in the storming of the Spanish town of St. Thomas; and R. returned to England, broken in spirit and in fortunes. He returned only to die. Examined before a commission of the privy council, he was found to have attacked the Spanish settlements and ships in his expedition to Guiana, or at least not to have prevented such attack; and this was deemed an act of piracy. 1618, Oct. 29, in the 66th year of his age, he was infamously put to death, nominally on the sentence passed on him 16 years before, but really, there is reason to suppose, in compliance on James's part with the urgencies of the king of Spain, who resented R.'s persistent hostility.

R. was a man of noble presence, of versatile and commanding genius, unquestionably one of the most splendid figures in a time unusually prolific of splendid developments of personality. In the art and finesse of the courtier, the politic wisdom of the statesman, and the skilful daring of the warrior, he was pre-eminent. The moral elevation of the man shone eminently in the darkness which beset his later fortunes; and the calm and manly dignity with which he fronted adverse fate conciliated even those whom his haughtiness in prosperity had offended. R.'s 'Life' has been written by Oldys; Cayley (1806); P. F. Tytler (1833); Edwards (1868); St. John (1868); his poems were published by Sir E. Brydges (1814); his *Miscellaneous Writings* by Dr.

Birch (1751); and his *Complete Works* at Oxford (8 vols. 1829).

RALLENTANDO, n. *răl'lĕn-tăn'dō* [It.—from *rallentārĕ*, to slacken]: in *mus.*, a term, frequently abbreviated *rallent.*, or *rall.*, indicating a gradual diminution of time.

RALLIDÆ, *răl'i-dē*: family of birds of order *Grallæ*, characterized by a long bill more or less curved at the tip and compressed at the sides, nostrils in a membranous groove, wings of moderate length, tail short, legs and toes long and slender, hind-toe on a level with the others. To this family belong rails, crakes, gallinules, coots, etc. The toes of some, e.g., coots, are margined with a lobed membrane; but these are by some ornithologists separated from this family (see COOT). Even

Rallus Aquaticus (Water-rail).

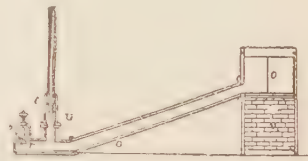
those R. of which the toes have no marginal membrane are fitted, by the length of their toes, for walking on mud or ooze. Many swim and dive well. Most of them are aquatic, or frequent either fresh-water or salt marshes; but some, as the crakes, are found in dry situations.

RALLY, v. *răl'li* [F. *railler*, to jest, to deride (see RAIL 5)]: to joke; to banter; to attack with good-humored satire, or with slight contempt: N. an exercise of good-humored satire. RAL'LYING, imp.: RAL'LIED, pp. *-lid.*—SYN. of 'rally': to banter; satirize; joke; ridicule; deride; mock.

RALLY, v. *răl'li* [F. *rallier*, to reassemble, to reunite: a corruption of Eng. *re-ally*: L. *re*, again; *ad*, to; *ligārĕ*, to bind]: to collect and reduce to order, as troops thrown into confusion after a defeat; to put into order; to recover or resume strength and vigor: N. the act of bringing troops to order; the act of recovering strength. RAL'LYING, imp. collecting and reducing to order. RAL'LIED, pp. *-lid.* RALLYING-POINT, the spot, or subject, or purpose, round which people unite or agree.

RAM, n. *răm* [Dut. *ram*, a ram: Dan. *ram*, rank in smell or taste, in allusion to the strong smell of the animal: Ger. *rammler*, the male sheep]: a male sheep—called also a *tup;* an anc. warlike instrument for battering walls; Aries, a sign of the ecliptic; a steam war-ship armed with a heavy steel or iron beak for driving

Ram.



Water-ram.

against and so destroying other vessels; a machine for raising water by the moving force of part of the water to be raised; the hammer of a pile-driver; the piston of a hydraulic press: V. to strike, like a ram with his head; to thrust in with much force; to drive hard down or together. RAM'MING, imp. RAMMED, pp. *răm̆d.* RAMMER, n. *răm'ér*, he who or that which rams; an instrument with which anything is driven hard; the rod with which the charge is forced into a gun—also called a *ramrod.* RAM'MISH, a. *-ish*, rank; strong-scented; lascivious. RAMS' HORNS, a familiar term in England for the incurved or curled fossil shells called *ammonites.*

RAMA, *rā'ma:* in Hindu mythology, name common to three incarnations of Vishnu, of Paras'urâma, Râmachandra, and Balarâma: see VISHN'U.

RAMADAN, n. *răm'ă-dăn'*, or RAMADHAN, or RAMADZAN, or RHAMADZAN [Ar. *Ramadan*, the hot month]: ninth month in the Mohammedan year. In it Mohammed received his first revelation, and every believer is therefore enjoined to keep strict fast through its entire course, from the dawn—when a white thread can be distinguished from a black thread—to sunset. Eating, drinking, smoking, bathing, smelling perfumes, and other bodily enjoyments, even swallowing one's saliva, obliged to take medicine, the Moslem must make some amends for it—e.g., spending a certain sum of money on the poor. During the night, however, the most necessary wants may be satisfied—a permission which practically is interpreted by profuse indulgence in all sorts of enjoyments. The fast of R., now much less observed than in former times, is sometimes a very severe affliction on the orthodox, particularly when the month—the year being lunar—happens to fall in the long and hot days of midsummer. The sick, travellers,

and soldiers in time of war, are temporarily released from this duty, but they have to fast an equal number of days at a subsequent period, when this impediment is removed. Nurses, pregnant women, and those to whom it might prove really injurious, are expressly exempt from fasting. According to some Mohammedan traditions (Al-Beidâwi), not only Mohammed, but also Abraham, Moses, and the Lord Jesus, received their respective revelations during this month. The principal passages treating of the fast of R. are in the second Surah of the Koran, called 'The Cow.'

RAMAGE, n. *răm'āj* [OF. *ramage*, boughs, branches: F. *ramage*, warbling of birds: It. *ramo*, a branch—from L. *rāmus*, a branch]: in *OE.*, branches of trees; the songs of birds on the branches of trees: ADJ. wild; shy—often applied to an untaught hawk.

RAMAL, a. *rā'măl* [L. *rāmus*, a branch]: in *bot.*, belonging to branches; branching; proceeding, or originating on it.

RAMAYANA, *rā-mā'yā-nā* [Sans.]: one of the two great epic Sanskrit poems of ancient India (for the other, see MAHABHARATA). Its subject is the history of Râma, one of the incarnations of Vishn'u (q.v.: see also RAMA); and its reputed author is *Valmîki*, according to the legend a contemporary of Râma. But though this point is quite doubtful, it seems certain that Valmiki—unlike Vyâsa (q.v.), supposed compiler of the *Mahâbhârata*—was a real personage; moreover, that the R. was the work of one poet—not, like the *Mahâbhârata*, a growth of various epochs and from different minds. As a poetical composition, the R. is therefore far superior to the *Mahâbhârata;* and it may be called the best great poem of ancient India, claiming a rank in the literature of the world which by some is compared to that of the epic poetry of Homer. Whereas the character of the *Mahâbhârata* is cyclopedical—its main subject overgrown by diversified episodes, its diction differing in poetical and grammatical merit, according to the ages that worked at its completion—the R. has but one object, the history of Râma (see VISHN'U—*Râmachandra*). Its episodes are rare, and its poetical diction shows throughout the same finish and the same genius. There can be no reasonable doubt that the R. is the older of the two. It contains (professedly) 24,000 epic verses, or *S'lokas*, in seven books, or *Kân'd'as*. The text exhibits, in different sets of manuscripts, considerable discrepancies; and it now exists in two recensions—a fact made known first by A. W. von Schlegel. One of the two, more concise and grammatically more archaic, is doubtless the older and more genuine text: there have been several editions of the older—a careful and elegant one at Bombay, 1861. William Carey and Joshua Marshman edited the first two books of the R., adding a translation in English and notes (1806–08). Another edition, eclectic, is that by A. W. von Schlegel. A complete translation of the

Rámáyan of Válmíki in English verse, by R. T. H. Griffith, principal of the Benares College, appeared 1870–75, five vols. Griffith published *Scenes from the R. Meghadutu*, etc., 1870.

RAMBLA, *râm'blâ:* market-town of Spain, in the modern province of Cordova, 23 m. s. of the city of Cordova, on a hill in a district which produces abundantly grain, wine, and oil. There are manufactures of coarse pottery, especially porous water-colors. Pop. (1877) 6,160.

RAMBLE, v. *răm'bl* [Sw. *ramla*, to rattle: Dut. *rammelen*, to rattle, to clash, to talk loosely and confusedly: Ger. *rammeln*, to tumble, romp]: to wander about from place to place without any particular object in view; to rove about loosely or irregularly; to be in an excited state; to talk in an incoherent or desultory way: N. a wandering; a moving about loosely and irregularly. RAM'BLING, imp. *-bling:* ADJ. roving; wandering; unsettled; incoherent; desultory: N. a wandering from place to place; an irregular excursion. RAM'BLED, pp. *-bld.* RAM'BLER, n. *-blér*, an irregular wanderer; a rover. RAM'BLINGLY, ad. *-li.*—SYN. of 'ramble, v.': to roam; rove; range; wander; stroll.

RAMBOUILLET, *rŏng-bô-yā'*, CATHERINE DE VIVONNE, Marquise DE: one of the most accomplished and illustrious women of the 17th c.: 1588–1665, Dec. 27; b. Rome, of Italian parents. She received a refined education under the superintendence of her mother, Marchesa di Pisani. At the age of 12, she was betrothed to a French nobleman, Charles d'Angennes, son of the Marquis de R., who succeeded to the family estates and title on the death of his father 1611. When the youthful marquise first appeared in the assemblies at the Louvre, she was shocked by the gross corruption of morals and manners among the mob of courtiers, and almost immediately conceived the idea of forming a select circle for herself, which should meet at her own house—the famous Hôtel de Rambouillet. Madame de R. was admirably fitted for presiding at the reunions which have made her famous in the literary history of France. Handsome and gracious, but free from coquetry and all personal pretensions, her affability, generosity, and loyal attachment to her friends, made her an object almost of worship to those admitted to her society. The writers of that epoch are unanimous in expression of their homage. The characteristic feature of the R. circle was the intercourse, on terms of equality, of the aristocracy of rank and the aristocracy of genius. There was a generous and adequate recognition of the dignity of letters. For 50 years the *salons* of the marquise were hospitably open to the wits, critics, scholars, and poets of Paris, beginning with Malherbe and Racan, followed by that distinguished circle of *beaux esprits* who contributed so much to the formation of the French language and taste—Costar, Sarrazin, Conrart, Patru,

Balzac, Ségrais, Godeau, Voiture, and Corneille; and closing with the generation that filled the interregnum from Corneille to Molière—Scarron, Saint-Évremond, Benserade, Duc de Larochefoucauld, etc. Many of the literary débuts of celebrated geniuses were made at the Hôtel de R.: here Corneille read his first piece, *Mélite;* and Armand du Plessis, afterward Cardinal Richelieu, sustained a *Thèse d'Amour;* and Boileau preached one of his earliest sermons. But the Hôtel was renowned almost as much for the brilliant and accomplished women who frequented it, as for its crowd of professional *littérateurs*. The names of Mademoiselle de Scudéry, of Mademoiselle Coligny—afterward Comtesse de la Suze—and of Marquise de Sablé, who inspired the *Maximes* of Larochefoucauld, are among the most distinguished of their time and country; but above them all, as conspicuous by [illegible] manner, the centre and delight of women and of men, shone the sister of the great Condé, and the heroine of the Fronde, Duchesse de Longueville. The combined influence of so many various [illegible] was profound and lasting on the literature and society of the 17th c., and is considered [illegible] to have developed quite a new art and ideal of lively, polished conversation. In [illegible] France has [illegible] taken the lead, placing itself, as regards society, in the front of European civilization. It has been customary to say that the *Précieuses Ridicules* of Molière was aimed at the foibles of the coterie of ladies in Madame de R.'s circle, known as *Précieuses:* there is possibly some truth in this as regards the little coterie, but not as regards the general circle. The *Précieuses Ridicules* was actually performed first at the Hôtel, and Molière, in the preface to his *Femmes Savantes*, protests against the supposition that he meant to reflect on a circle which he affirmed had every claim to respect. It appears, from investigation, that grotesque imitations of the manners and style of the Hôtel had, in the course of years, become prevalent in Paris and the provinces, and that it was these, and not their charming prototype, which drew the satire of Molière. Madame de R. died at Paris. See Roederer's *Mémoire pour servir à l'Histoire de la Société polie en France pendant le dix-septième Siècle;* and Victor Cousin's *Jeunesse de Mde. de Longueville, Mde. de Sablé, etc.*

RAMEAU, *ra-mō*, JEAN PHILIPPE: French musician: 1683, Sep. 25—1764, Sep. 12; b. Dijon; son of the organist of the Sainte Chapelle there. He showed genius for music almost from infancy; and choosing it as a profession, set out for Italy at the age of 18, but proceeded no farther than Milan. After traveling through France, and acquiring considerable reputation as a performer on the organ, he was appointed organist of the cathedral of Clermont, Auvergne, and wrote while there *Traité de l'Harmonie*, published Paris 1722. Removing to Paris, he became organist of Sainte Croix de la Bretonnerie, and published various treatises connected with the the-

ory of music. In 1733, at the mature age of 50, he produced his first opera, *Hippolyte et Aricie*, the drama of which was written by Abbé Pellegrin. It created a great sensation, and R. was forthwith elevated to the position of a rival to Lulli as an opera composer, musicians being divided in partizanship for the two artists. R.'s best opera was *Castor et Pollux*, produced at the Académie Royale de Musique 1737: it contains one chorus scarcely surpassed in the whole range of theatrical music. 1733–60 he composed 21 operas and ballets, as well as numerous harpsichord pieces. His works on harmony gave him deservedly high reputation as a musical theorist: he has been called the Newton of musical science. Louis XV. created for him the office of Cabinet Composer, granted him letters of nobility, and named him a Chevalier de St. Michel.

RAMED, a. *rāmd* [Eng. *ram*]: in *ship-building*, said of a ship on the stocks when the frames, stem, and sternpost are up and adjusted.

RAMENTA, n. *rā-mĕn'tà* [L. *rāmen'ta*, scrapings, shavings, from *rado*, I scrape]: in *bot.*, thin, brown, leafy scales with which the stems of some plants, especially ferns, are covered. RAMENTACEOUS, a. *rām ĕn-tā'shŭs*, covered with ramenta or scales.

RAMEOUS, a. *rā mē-ŭs* [L. *rāmĕ'us*, of or belonging to branches—from *rāmus*, a branch]: in *bot.*, belonging to a branch; shooting or growing from a branch.

RAMESES, *ram'ĕ-sēz*, or RAAMSES, *rā-ām sēz*: district and town in Lower Egypt; the town being usually deemed one of the fortresses or treasure-cities built by the Hebrews during their bondage in Egypt. The name of this fortress, important for the date of the Exodus - placed B.C. 1491 or 1485 by the old chronologers, and placed B.C. 1314 by Lepsius, but now, with most probability, B.C. 1317, Apr. 15- is found in the papyri of the British Museum in documents of the age of Meneptah; while Rameses III. is represented at Medinet-Habu in one of his campaigns, marching out of the Magdol (tower) of Rameses. The situation of R. has puzzled geographers and commentators, and it has been supposed to be Abaris, Baal-Zephon, Heroöpolis, Pelusium, and Abu-Keschcheh. Notwithstanding the opposition to dating the fortress Rameses in the period of the 19th dynasty, it is now generally admitted to have been constructed at that period. In fact, no fort was ever named by the appellation of a prince, it being the prerogative of only the monarch to have the fortress named after him. The evident solution of the difficulty is, that the exodus of the Hebrews took place under a king Rameses, at whatever chronological period his reign may have happened. —A remarkable and important discovery of royal mummies, papyri, and other relics was made in a pit near Thebes 1881. Among the mummies were those of Rameses I. and Rameses II., probably removed and concealed here on occasion of some hostile invasion.

RAM'ESES, or RAAM'SES ('born of the sun,' or 'the nascent sun'): name of several Egyptian monarchs, some of whom were known to the Greek and Roman writers and the classic legists. The R. family is supposed to have been of Theban origin, descended from one of the later queens of the 18th dynasty. The exploits of R. are confounded by the Greek and Roman writers with those of Sesostris (see SESOSTRIS), and mingled in the legend of Armais, the Danaus of the Greeks. R. is said to have had a great army and navy, and, at the head of a force of 700,000 men, to have conquered Ethiopia, Libya, Persia, and other eastern nations. Before leaving his kingdom for these distant expeditions, he is said to have appointed his brother Armais or Danaus regent of the kingdom, charging him neither to assume the diadem, nor interfere with the royal harem. R. then proceeded to conquer Cyprus, Phœnicia, the Assyrians, and Medes. Armais contravened the orders, and R., informed of it by the high priest, suddenly returned to Pelusium, and resumed the kingdom, expelling his brother, who, fleeing with his daughters, the Danaïdes, to Argos, established himself in Greece. According to the Roman authors, however, Troy was taken in the reign of Rameses. The walls of the temples of Thebes were said to be covered with inscriptions and scenes recording his conquests and the tributes rendered to him, and these were interpreted by the priests to Germanicus on his visit to Egypt. Such is the account given of a monarch called R. by the classical authors.

The following are the principal princes and monarchs of this name, found on the monuments of Egypt.—1. A prince or king represented with the royal families of the 18th dynasty in a sepulchre at Thebes.—2. R. I., chief of the 19th dynasty, who reigned but a short time, and whose name is found on the monuments of Thebes and the Wady Halfa.—3. R. II., or the Great, now generally believed to be the Pharaoh of the Hebrew oppression, who mounted the throne at a very early age, conquered the Khita or Hittites, and other confederate nations of central Asia, in his 7th year, and concluded an extraditionary treaty with the Khita in his 21st year. Other nations, European and African, fell under his sway, and his empire extended far s. in Nubia, the ancient Ethiopia, which he governed by viceroys. He erected fortresses and temples in foreign lands, and embellished all Egypt with his edifices. He had two wives, 23 sons, and 7 daughters; and was finally buried in the Biban-el-Moluk. He is the supposed Sesostris, according to most authors. He reigned 68 years. His son Meneptah I. is now generally identified with the Pharaoh of the Exodus (see EXODUS).—4. R. III., chief of the 20th dynasty, the Rhampsinitus of Herodotus, called Meriamoun, or beloved of Ammon, who defeated the Philistines, the Mashuasha, and the Libyans, carrying on important wars from the 5th to the 12th year of his reign;

he also made conquests in the 16th, and seems to have reigned 55 more years. He founded the magnificent pile of edifices of Medinet-Habu, embellished Luxor, Gurnah, and other parts of Egypt. Some attribute to him the exploits of the R. of the Greek and Roman writers.—5. R. IV. reigned a short time, and performed no distinguished actions.—6. R. V., of whom inscriptions are found at Silsilis.—7. R. VI., whose tomb at the Biban-el-Moluk contains some astronomical records from which the date of his reign has been calculated at B.C. 1240.—8.–12. R. VII., VIII., IX., X., and XI., undistinguished monarchs.—13. R. XII., who reigned more than 33 years, in whose reign the statue of the god Chons was sent from Egypt to the land of the Bakhten, to cure a princess of the royal family of that court, with which R. had contracted an alliance.—14. R. XIII., an unimportant monarch.

RAMFEEZLED, a. *răm-fēz'ld* [Scot.]: fatigued; exhausted. The word was humorously borrowed from Burns by Cowper.

RAMIE, or RAMEE, *răm'ē* (*Bœhmeria*): valuable fibre plant, native of Asia, belonging to the nettle family, but with stingless hairs. It is largely grown in Asiatic countries, to some extent in France, and on a small but increasing scale in Cal. and some southern states. Considerable quantities of the fibre, obtained from the inner bark, are imported into England and manufactured there. It is made into thread, lace, and cloth; is used often with cotton and wool; and forms quite a proportion of the material of which some goods sold as fine silk are composed. The fibre is stronger than flax, and receives dyes without injury to its lustre or durability. The leaves are said to be good food for silk-worms, and to furnish material for paper; and in China the seed is used for making confectionery. In Asia, where labor is cheap, the fibres are separated by hand; but in Europe and the United States, decorticating machines have been introduced. A chemical method has recently been invented in France which perfectly supplements the machine-work, and reduces the whole process of preparing the fibre to a period of two hours.—There are various species of R. The famous China-grass cloth is made from *B. nivea* (see BŒHMERIA); a coarser fibre is obtained from *B. candicans*, and a valuable one from *B. tenacissima*. Experiments in Cal. indicate that R. will become a very valuable product. The plants are propagated by seeds or by root-cuttings, usually the latter. The plants are set three by four feet apart, requiring about 3,500 per acre, and in a few years will spread so as to cover the ground. When well established, three crops can be secured in a year. The total weight of dry stalks per acre varies from 800 to 2,000 lbs., about 15 per cent. of which is raw fibre.

RAMIFY, v. *răm'ĭ-fī* [F. *ramifier*—from mid. L. *ramificārĕ*, to ramify—from L. *rāmus*, a branch; *faciō*, I make]: to divide into branches; to shoot or spread out into branches or parts. RAM'IFYING, imp. RAM'IFIED, pp. *-fīd.* RAM'IFICA'TION, n. *-ĭ-fĭ-kā'shŭn* [F.—L.]: the act of branching, or dividing into branches; a branch; a division; in *bot.*, sub-divisions of roots or branches; the manner in which a tree produces its branches; in *anat.*, the leading or spreading of small vessels from a large one.

RAMILLIES, *râ-mēl-yē'* or *râ-mē-yē':* small village of Brabant, Belgium, 28 m. s.e. of Brussels; memorable as the place near which one of the most important battles of the War of the Spanish Succession was fought, 1706, May 23. In this conflict, the French forces were under the command of Marshal Villeroy and the Elector of Bavaria, while Marlborough led the troops of the allies. Villeroy, after a battle of three hours and a half, was defeated, with the loss of almost all his cannon, the whole of his baggage, and 15,000 killed and wounded. The great result of this victory was that the French were compelled to give up the whole of the Spanish Netherlands.

RAMMED, RAMMER, RAMMISH, etc.: see under RAM.

RAMMELSBERG, *ram'mĕls-bĕrgh:* one of the Harz Mountains, Germany; rising 2,092 ft. above sea-level, and noted for its mines of gold, silver, lead, zinc, copper, sulphur, vitriol, and alum. They have been worked, according to tradition, from 968; and their possession was for ages a source of strife between the inhabitants of Goslar (q.v.) and the dukes of Brunswick.

RAMMOHUN ROY, *răm'mō-hŭn roy:* renowned Hindu rajah: b. Burdwan, province of Bengal, between 1774 and 80; died 1833, Sep. 27. In a sketch of his own life in 1832, he states that his ancestors were Brahmans of a high order. He was well educated, as a Hindu; and made a thorough study of Sanskrit, and the works in it, which contain the spirit of Hindu law, literature, and religion. In early youth, beginning to investigate the various religious doctrines held by those around him, he found them repugnant to his vigorous understanding, and openly declared this fact. The result was a quarrel with his father, his family, and his community. For a long time he had a strong, perhaps not unfounded, dislike to the English; but becoming convinced that their sway was, on the whole, beneficial to India, his sentiments changed, and he applied himself to study of the English language. For five years he held the office of revenue collector in the dist. of Rungpur. In 1803 his father died, but left him no part of his estate. In 1811, however, by the death of his brother, he succeeded to affluence. He published various works in Persian, Arabic, and Sanskrit; the object of the whole being the uprooting of idolatry. He issued in English an abridg-

ment of a work called the *Vedant*, giving a digest of the Vedas, the ancient sacred books of the Hindus. Becoming more convinced, as he grew older, of the excellence of the moral elements of Christianity, he published (1820) *The Precepts of Jesus, the Guide to Peace and Happiness*. This work shows his acceptance of the moral precepts of Christ; but that he did not concede his supreme divinity, nor the reality of the miracles recorded in the gospels, nor other doctrines held fundamental in the various churches of Christendom. 1831, Apr., the rajah visited England. His society was universally courted there, and he was oppressed with invitations to social parties, and political and ecclesiastical meetings. His anxiety to see everything and to please all led him to overtask himself; his health, long failing, at last broke down, and he died at Bristol. He was founder of the well-known Theistic Church of India, the *Brahmo Somaj* (q.v.), led subsequently by Debendra Nath Tagore and by Keshub Chunder Sen (see SEN, KESHUB CHUNDER). The *Arya Somaj*, under Dayananda Sarasvati, was more conservative; advocating a reform in Hindu religion, but taking its stand on the Vedas, their inspiration and infallible authority. See Mary Carpenter's *Last Days of R. R.* (1866).

RAMNAD, *râm-nâd'*: town of Brit. India, dist. of Madura, presidency of Madras; about five m. from the shore of Palk's Bay. In the centre of the fort is the palace of the zemindar, one of the greatest of his class in s. India, his extensive possessions containing more than 2,000 villages, and nearly 300,000 inhabitants.—Pop. of R. 15,000.

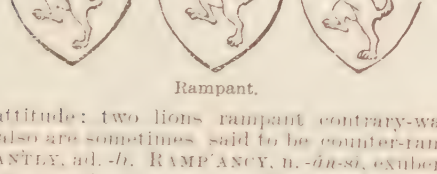
RAMNAGHAR, *râm-nŭ-gûr'*, or RAMNUGGUR, *râm-nŭg'gŏr*: town of Brit. India, N. W. Provinces, in the dist. of Benares, four m. s. of the city of Benares, on the right bank of the Ganges. Its fort, the residence of the rajah, rises from the banks of the sacred stream by a number of fine ghats or flights of stairs. Pop. 12,000.

RAMNAGHAR', or RAMNUGGUR (Town of God); formerly RASULNUGGUR: walled town of the Punjab, beautifully situated in an extensive plain on the left bank of the Chenab, 65 m. n.n.w. of Lahore. There is a ferry across the river, which here is 300 yards wide and 9 ft. deep. It was an important place in the 18th c. and was stormed 1795 by Ranjit Sing: of late it has declined. Pop. about 8,000, of whom 4,500 are Mohammedans.

RAMOLLESCENCE, n. *răm'ŏl-lĕs'ĕns* [F. *ramollir*, to soften; *ramollissant*, softening—from L. *re*, again; *ad*, to; *mollĭo*, I make soft; *mollis*, soft]: a softening; enervation. RAMOLLISSEMENT, n. *-lĭs'mĕnt* [F.]: in *anat.*, a disease, condition of a part of the body in which it becomes softer than is natural, usually limited in its application to the nervous system.

RAMOUS, a. *rā'mŭs*, or RAMOSE, a. *rā-mōs'* [L. *rāmōsus*, full of boughs—from *rāmus*, a branch]: in *bot.*, producing branches; very much branched.

RAMP, v. *rămp*, or ROMP, v. *romp* [It. *rampare*, to clamber: F. *ramper*, to creep or climb, as a plant: Dut. *rammelen*, to rattle: Ger. *rammeln*, to romp: comp. Eng. *rampage*, to scour up and down]: to jump; to leap; to bound; to sport about in a wild, riotous manner; to climb, as a plant: N. a leap; a bound: in *hand-railing*, a sudden upward bend or slope in the hand-rail of a stair: in *fort.*, a road cut obliquely into, or added to, the interior slope of a rampart, or of a parapet, serving as a communication between two levels: gradual slope by which approach is had from the level of the interior area, or of a town, to the terre-plein or general level of the fortifications behind the parapet. RAMPING, imp.: *adj.* leaping or bounding with violence. RAMPED, pp. *rampt*. RAMPANT, a. *rămp'ant*, overgrowing the usual bounds; overleaping restraint: in *her.*, standing erect on the hind-legs, as if for attack, with one fore-leg elevated, the head being seen in profile. When the face is turned toward the spectator, the attitude is called *rampant gardant*; and when the head is turned backward, *rampant regardant*. A lion *counter-rampant* is one rampant toward the sinister, instead of toward the dexter, the



Rampant.

usual attitude: two lions rampant contrary-ways in saltire also are sometimes said to be counter-rampant. RAMP'ANTLY, ad. *-li*. RAMP'ANCY, n. *-an-si*, exuberance; excessive growth or practice. RAMPANT PASSANT a. *rămp ant păs ant*, in *her.*, said of an animal when walking with the dexter fore-paw raised somewhat higher than the mere passant position. RAMPANT SEJANT, a. *sē'jant*, said of an animal when in a sitting posture, with the fore-legs raised.

RAMPAGE, v. *rămp'āj* [It. *rampare*, to clamber, to paw like a lion or bear: F. *ramper*, to climb: Ger. *rammeln*, to tumble and toss about the limbs: comp. Eng. *ramp* or *romp*]: to romp or prance about with unrestrained spirits; to be furious: N. a state of passion or fury. RAMPAGING, imp. RAMP'AGED, pp. *-ājd*. RAMPAGEOUS, a. *rām-pā'jŭs*, in *Scot.*, furious; violently unsettled.

RAMPALLIAN, n. *rām-pāl'yăn*, or RAMPALL'ION, *yŭn* [prov. F. *rambal*, confused noise; comp. Scot. *rallion*, a clattering noise]: in *OE.*, a coarse, vulgar person; a mean creature; a scamp: see RAPSCALLION.

RAMPANCY, RAMPANT, RAMPING: see under RAMP.

RAMPART, n. *răm'pärt* [F. *rempart*, the wall of a fortress—from L. *re*, again; *em* for *in*, in; *parārĕ*, to make ready: It. *riparo*, a defense: r. *parer*; It. *parare*, to ward off]: the enceinte or main line of every permanent Fortification (q.v.): constructed immediately within the main ditch by throwing up the soil excavated from it; or by rearing a mound or wall of masonry surrounding a fortified place, on which guns and troops are placed. On the front of the R. the parapet is raised, and width should be left behind it to allow of guns, wagons, and troops passing freely within on the top of the rampart. The R. consists of an interior and an exterior slope, a banquette, etc. Its height is dependent on the relief (height) of the buildings to be defended, and on the positions in the neighborhood which an enemy might assume. In a restricted sense, R. is the platform behind the parapet: in general, anything that fortifies or secures safety.—SYN.: bulwark; guard; fence; security.

RAMPHAS'TIDÆ: see TOUCAN.

RAMPION, n. *răm'pĭ-ŏn* [It. *raperonzo*, Sp. *reponche*; F. *raiponce*; Ger. *rapunzel*, rampion—from L. *rāpum*, a turnip], (*Campanula rapunculus*: see CAMPANULA): perennial plant, native of Europe, with a stem about two ft. high, and a panicle of very pretty pale-blue bell-

Rampion.

shaped flowers. The radical leaves are ovato-lanceolate and waved. The root is white and spindle-shaped, and was formerly much used for the table, under the name

Rampion or *Rumps*. The plant is still commonly cultivated in France for its roots, used either boiled or as salad, and for its young leaves, used as salad. A N. American garden species, with nodding bell-flowers, is similar, and hence named *C. rapunculoides*.

RAMPIRE, n. *ram'pir* OE. for RAMPART. RAMPIRED, a. in *OE*. defended or protected by ramparts.

RAMROD, n. *ram'rod* [see RAM]: the rod used in driving home the charge to a gun.

RAMSAY, ALLAN, Scottish poet, DSE, Oct 15—1758, Jan. 7; b. in the parish of Crawford, Lanarkshire. His father was manager of Lord Hopetoun's mines at Leadhills. In his 15th year, both his parents having died, he was apprenticed to a wigmaker in Edinburgh. He had received the ordinary education of a parish school, and could read Horace, as he says, 'faintly in the original.' Till his 24th year, he continued in the occupation of a wigmaker, 'though he had become known as a poet, having issued several short humorous pieces, printed as broadsides. R. gained the patronage of prominent men, abandoned wigmaking, and began as a bookseller. He established a circulating library, the first in Scotland. R.'s career, worldly and literary, was eminently prosperous. He was careful and industrious; and though always courting patronage, he never selected a fool for his patron. The following are his principal works: *Tartana, or the Plaid*, 1721; a collected edition of his *Poems*, published by subscription 1721, by which it is said the poet realized 400 guineas; *Fables and Tales*, 1722; *Fair Assembly*, 1723; *Health, a Poem*, 1724; *The Tea-table Miscellany*, a collection of the most choice songs, Scottish and English, 1724, to which was added a 2d vol. 1725, a 3d 1727, and a 4th 1740; *The Evergreen*, 'being a collection of Scots Poems wrote by the Ingenious before 1600,' published 1724; *The Gentle Shepherd, a Pastoral Comedy*, 1725, to which songs were added 1728; a second collection of *Poems*, published by subscription 1728; *Thirty Fables*, 1730. Of most of these publications numerous editions were called for—nine of *The Tea-table Miscellany* in nine years. One brief cloud overcast the poet's successful career. He entered into a speculation for building a theatre in Edinburgh, which was almost immediately shut up by the magistrates, in virtue of the act passed 1737. This affair was a serious loss to the poet, and subjected him to attacks in print, such as 'The Flight of Religious Piety from Scotland upon the account of Ramsay's Lewd Books and the hell-bred Playhouse Comedians,' etc. Allan bore all with Horatian philosophy and indifference. The last two or three years of his life were spent in cheerful retirement in the picturesque house that he had built on the n. side of the Castle Hill; and there he died.

The Gentle Shepherd is R.'s greatest work; indeed, is usually esteemed the best pastoral in any language. Its characters are realities, not shadowy Corydons or

Phyllises, maundering over crooks, or sleeping to the murmur of bees. It contains faithful transcripts of actual life and feeling, such as the poet had witnessed in his youth on the banks of the Clyde and Glengonar. The poetry abounds in graphic expression and touches of homely nature and arch humor that to Scotsmen are irresistible, while the plot is skilfully constructed to bring out rustic character, customs, and superstitions. Some of R.'s songs, tales, and fables lack refinement; and his *Gentle Shepherd* presents in the hero a moral ideal neither high nor worthy. As editor, he has been censured for tampering with the works of the old bards, retouching, adding, or retrenching at his pleasure; but he also rescued many choice productions of the elder muse from neglect, and awakened in Scotland a taste for its native literature. A complete ed. of his poems, with biography, was published by Chalmers (1800, new ed. 1874); a fine ed., with the music of the songs, and engravings by David Allan, 1879. A monument to R. was erected in Edinburgh 1865.—His son, ALLAN R., (about 1713–84), studied art in Rome, became a portrait-painter, and gained the favor of George III., who appointed him, 1767, principal painter to the king.

RAM'SAY, DAVID, M.D.: 1749, Apr. 2—1815, May 8; b. Lancaster co., Penn. He graduated from Princeton College 1765, taught school, and studied medicine at the University of Pennsylvania. In 1773 he commenced practice in Charleston, S. C. He was an ardent patriot, served as surgeon in the revolution, and was a member of the state legislature 1776–83; was held 11 months by the British as a hostage; was a member of the continental congress 1782–86, and for several years was pres. of the state senate. He published numerous political and patriotic papers; also books, among which were a *History of the Revolution of South Carolina* (1785); *History of the American Revolution* (1789); *History of the United States*, 1607–1808. He died at Charleston.

RAM'SAY, GEORGE DOUGLAS: soldier: 1802 Feb. 21—1882, May 23; b. Dumfries, Va. He graduated from West Point 1820, served in various garrisons and surveys, had charge of arsenals, was actively engaged in the Mexican war as chief of ordnance and was brevetted for gallant service, was afterward commander of arsenals, became chief of ordnance of the U. S. army 1863, and, on account of age, retired from active service 1864, though he continued to hold important positions. By various promotions he reached the rank of brig.gen. 1863, and 1865 was brevetted maj.gen. U. S. army 'for long and faithful services.' He died at Washington.—His son, FRANCIS MUNROE R., b. in the Dist. of Columbia 1835, Apr. 5, became a midshipman 1850, rendered valuable service as commander in various naval engagements in the civil war, and has been supt. of the Naval Acad., and member of the examining board.

RAM'SAY, NATHANIEL: soldier: 1751, May 1—1817, Oct. 23; b. Lancaster co., Penn.; bro. of David R. He graduated from Princeton College 1767, studied law, and began practice in Cecil co., Md., 1771. He was in active milit. service during nearly the whole period of the revolution, commanded a regt. and rendered distinguished service at the battle of Monmouth and in other engagements, was promoted lieut.col., was member of congress 1786–7, was twice appointed marshal of Md., and for a long period was naval officer of the dist. of Baltimore. He died at Baltimore.

RAM'SAY, WILLIAM, PH.D., F.R.S.E.: 1852, Oct. 2—— —— ——: chemist; b. Glasgow, Scotland. His father was a civil engineer. He was educated at the Glasgow Academy and at Glasgow University, and at the age of nineteen went to Tübingen to study chemistry under Prof. Fittig, and was graduated PH.D. in 1872. From 1872 to 1874 he acted as chief assistant to the 'Young' chair of technical chemistry in Anderson's College, Glasgow, and from 1874 to 1880 as 'tutorial' assistant to the chemical professor in Glasgow Univ. He was appointed professor of chemistry in University Coll., Bristol, in 1880, becoming principal of that college the following year; was appointed to the chemical chair at University Coll., London, in 1887. He was elected a fellow of the German Chemical Society in 1872, of the Royal Society in 1888, besides many other scientific associations. In April, 1894, he joined Lord Rayleigh (q.v.) in his investigations of the atmosphere, resulting in their discovery of argon (q.v.) in July, 1894. He is the author of numerous papers in the *Philosophical Transactions*, the Chemical Society's *Transactions*, and in other British and foreign journals; also of several text books of chemistry.

RAM'DEN, *rămz'dĕn*, JESSE: astronomical instrument-maker: 1735–1800, Nov. 5; b. Salterhebble, near Halifax, Yorkshire, England. He received a good education, and became (1762) a working engraver in London. Having married Dollond's daughter, he received as her dowry a share in his father-in-law's patent for achromatic telescopes. The sextants of his time were untrustworthy within 5′ of a degree, and R. reduced the possible error to within 30″, while he reduced the cost by one-third. This brought to him a great tide of business, and he invented a machine which could graduate instruments much more rapidly and accurately than could be done by hand. For this invention he received from the board of longitude a premium of about $3,000. The accuracy of his instruments was the delight of astronomers. He constructed telescopes for the observatories of Blenheim, Mannheim, Dublin, Paris, and Gotha, and mural quadrants for those of Padua and Vilna. He recommended the introduction of the mural circle instead of the Quadrant (q.v.). He died at Brighton, leaving much of his estate to be divided among his workmen. R. was a member of the Royal Soc., a fellow of the Imperial Acad. of St. Petersburg, and possessor of a Copley medal (gift of the Royal Society).

RAMSEY, *răm'zĭ:* town in the Isle of Man, 16 m. n. of Douglas; which, from beauty of situation and salubrity of climate, is a resort of tourists and pleasure-seekers. It stands on the margin of a spacious bay, and has a background of lofty wooded hills. The waters abound in fish. Extensive harbor-works have been erected. Steam-packets run regularly from R. to Liverpool and to Whitehaven, and the town is connected with Douglas by railway. Resident pop. (1891) 4,803.

RAMSGATE, *răm'gāt* (*Rium's* Gate; *Rium* is the British name of Thanet): seaport and watering-place in the s.e. of the Isle of Thanet, 72 m. e.s.e. of London by railway. Anciently, it was a small fishing-village; but it began to increase in importance about the beginning of the 18th c., when a number of its inhabitants opened a successful trade with 'Russia and the east country.' The recently-built portion of the town consists of well-arranged streets, crescents, and terraces; and the older part is situated in a natural depression or cutting in the chalk-coast, opening out toward the sea, and called in this district a 'gate' or 'stair.' The climate is very bracing and helpful in cases of scorbutic disorder. The harbor—51 acres in extent, inclosed on the e. by a fine pier 3,000 ft. in length, and on the w. by another pier 1,500 ft.—serves as a harbor of refuge for the Downs. Pop. (1881) 22,605; (1891) 24,676.

RAMSHACKLE, a. *răm'shă-kl* [Ice. *ramskakkr;* fr. *ramr*, very; *skakkr*, wry]: out of repair; loose; ready to go to pieces.

RAMS'HORNS, in Fortification: semi-circular works of low profile in the ditch, which they sweep, being themselves commanded by the main works. They were invented by Belidor, French engineer, and when used take the place of *Tenailles* (q.v.).

RAM'SKIN: species of cake made of grated cheese and dough as prepared for fine puff-pastry; then rolled out, and cut into shapes, glazed with white of egg, and baked for a quarter of an hour. It is usually eaten hot.

RAMSONS, n. *răm'sŭnz* [AS. *hramsan*, ramsons: Ir. *creamh*, garlic]: a kind of wild garlic, *Allium ursinum*, ord. *Liliăceæ*.

RAMTIL (*Guizotia oleifera*): plant of nat. order *Compositæ*, sub-order *Corymbĭfĕræ;* native of the E. Indies and Abyssinia, esteemed for the bland oil obtained from the seeds and used for the same purposes as olive-oil. The R. is extensively cultivated in India, chiefly in Mysore.

RAMULI, n. plu. *răm'ū-lī* [L. *rāmŭlus*, a little branch—from *rāmus*, a branch]: in *bot.*, twigs or small branches. RAM'ULOUS, a. *-lŭs*, or RAM'ULOSE, a. *-lōs*, having many small branches. RAM'ULUS, n. *-ū-lŭs*, a small branch.

RAMUS, n. *rā'mŭs* [L. *rāmus*, a branch]: a branch or sub-division of a stem; each half or branch of the lower jaw or mandible of vertebrates; branch of a vein or artery, etc.; a projecting part.

RAMUS, *râ-müs'* (Latinized form of *De la Ramée*), PIERRE: French 'humanist:' 1515-1572, Aug.; b. at the village of Cuth, in Picardy; son of a poor laborer. His thirst for knowledge was so great, that, twice before he had reached his 12th year, he travelled on foot to Paris, hoping to get admission to some school there; but the misery of want twice drove the brave boy home again. In his 12th year, however, he got a situation as servant to a rich scholar at the Collége de Navarre; and by giving the day to his master, obtained the night for study, and made rapid progress. He took his degree M.A. in his 21st year. The method of teaching philosophy then prevalent dissatisfied him, and he was gradually led to place a higher value on 'reason' than on 'authority,' contrary to the mental habit of his time. His contempt for 'authority' blinded him (as is usual with a young reformer) to what truth 'authority' might contain: thus in his thesis on taking his degree he maintained with audacity and ability the proposition, Everything that Aristotle taught is false. R. became a teacher in the Collége du Mans, where his success was remarkable. He then turned his attention particularly to the science of logic, which, in his usual adventurous spirit, he undertook to 'reform:' these attempts excited hostility among the Aristotelians; and when his treatise on the subject (*Dialectica Partitiones*) appeared 1543, it was fiercely assailed by the doctors of the Sorbonne, who managed to procure its suppression by royal edict, and even barbarously demanded that its author should be sent to the galleys. But R. had (at this time) two powerful friends, Cardinals Charles de Bourbon and Charles de Lorraine, who protected him from personal injury, and through whose influence he was, 1545, appointed principal of the Collége de Presles. In 1551 Card. Lorraine instituted for him a chair of eloquence and philosophy at the Collége Royal; and his inaugural address (*Pro Philosophica Disciplina*, Par. 1551) is reckoned a masterpiece. He gave the first eight years of his teaching to the first three of the 'liberal arts' (grammar, rhetoric, and logic), which he called elementary or exoteric; and published three grammars successively, Greek, Latin, and French. But though R. had innumerable adversaries, he might have defied them all, so great was his influence at court, had his love of 'reformation' not displayed itself in 'religion' as well as in logic. His intellect was by nature scornfully rebellious toward the *ipse dixit* of 'authority;' still he had for years decently conformed to the practices of the Rom. Cath. cult; but after Card. Lorraine, in reply to the Conference of Poissy (1561), frankly admitted the abuses of the church and the vices of the clergy, R. openly embraced Protestantism. The outbreak of the religious wars in France plunged him into the dangers of the time, and he perished in the massacre of St. Bartholomew.

R. holds honorable place among intellectual reformers.

His assault on scholasticism as a *method of thinking* is vigorous, and, on the whole, well directed; his exposure of its puerile and useless subtleties is thorough, and entirely in accordance with later criticism. In his contempt for the illiterate worship of Aristotle, in his admiration of Plato and of the ancient orators and historians, he ranks (though late) with the scholars of the Renaissance; but in his assertion of 'reason' as the criterion of truth, he must be regarded as the forerunner of Descartes and many writers of the modern world. His system of logic, by which his name is best known, has admirable improvements on the older systems; but (like every pre-Baconian system) it fails to recognize the supreme importance of the inductive method. R. had a universal intellectual activity: he was the first mathematician of his age in France, and wrote treatises on arithmetic, geometry, and algebra, which were textbooks for a hundred years; he was among the earliest adherents of the 'Copernican' system of astronomy, and in natural philosophy avowed himself an enemy to hypotheses and abstractions. His followers were long a powerful body of thinkers and teachers. France, England, the Low Countries, Germany, Switzerland, Denmark, even Spain, had their *Ramists*, as they were called, and they have disappeared chiefly because their tendencies are embraced in the broader and more critical methods of modern scientific inquiry. A list of his writings is given in the *Nouvelle Biographie Universelle*, article 'Ramus.'—See Waddington's *Ramus, sa Vie, ses Écrits, et ses Opinions* (Paris 1855); E. Saisset's *Les Précurseurs de Descartes* (Paris 1862); and C. Desmaze's *P. Ramus, Professor au Collége de France, sa Vie, ses Écrits, sa Mort* (Paris 1864).

RAN: pt. of RUN, which see.

RANA, n. *rā'nă* [L. and It. *rānă*, a frog: akin to Skr. *ru*, to utter a sound]: systematic name for frogs. RANINE, a. *rā'nīn*, applied to an artery under the tongue. RANANITES, n. plu. *rā'nă-nīts*, a sect among the Jews who venerated frogs, because they had plagued Pharaoh. RANULA, n. *răn'ū-lă* [L. *rānŭla*, a tadpole]: a small swelling or tumor under the tongue. For Rana and Ranidæ, see FROG.

RANCÉ, *rŏng-sā'*, ARMAND JEAN LE BOUTHELIER DE: founder of the reformed order of La Trappe (see TRAPPISTS): 1626, Jan. 9—1700, Oct. 27; b. Paris. He took his degree in the Sorbonne, embraced the ecclesiastical profession, soon became distinguished as a preacher, and, through the favor of Card. Richelieu, obtained more than one valuable benefice. He inherited, while young, a large fortune; and for a time, notwithstanding his clerical character, was carried away by the gay dissipation of Parisian life. After a time, however, being deeply moved by the death of the Duchess de Montazon, to whom he was much attached, he withdrew from Paris, and after a time resolved to sell all his property, dis-

tribute the proceeds among the poor, and devote himself to piety and penitential works. Finally, he resigned all his preferments, of which, by the abusive practice of the period, he had several simultaneously, except the abbacy of La Trappe, to which convent he retired 1662, with the intention of restoring the strict discipline of the order. For the reforms which he effected, see TRAPPISTS. He lived in this seclusion 33 years, during which he published many works, chiefly ascetical. In his youth he had edited *Anacreon*.

RANCESCENT: see under RANCID.

RANCH, n. or RANCHE, n. *ransh* [Sp. *rancho*, a mess-room,] originally a rude hut; a rancho; now, in the south-western states, a cattle-breeding farm—in many cases of vast extent and owned by wealthy companies. RANCHO, n. *răn'chō*, in *Mexico*, a small village or large private establishment where cattle are reared. RANCHERO, n. *răn-chā'rō*, in *Mexico*, a herdsman; usually one of a mixed breed of Spanish and Indian blood, who are splendid riders and hunters, and form the bravest part of the Mexican army—its irregular cavalry. The rancheros are dark in complexion, with brown weather-stained faces and muscular limbs, hardy, temperate, and always ready for the boldest enterprises.

RANCID, a. *ran'sid* [L. *rancidus*, stinking; It. *rancido*, tainted: F. *rance*, musty: Dut. *ranst;* Ger. *ranzig*, rancid]: having a rank unpleasant odor or smell, particularly applied to fats and oils in bad condition; sour; musty. RAN'CIDLY, ad. *-li*. RAN'CIDNESS, n. *-nĕs*, or RANCIDITY, n. *răn-sid'i-ti*, quality of being rancid; a strong disagreeable smell or odor, as of old oil (see OILS). RANCES'CENT, a. *-sĕs'ĕnt*, becoming rancid.

RANCOR, n. *răng'kĕr* [It. *rancore* rage, spite: prov. F. *rancœur*, disgust: L. *rancens*, putrid]: deep-seated hate or malice; implacable enmity; spite; bitterness; in *OE.*, virulence; corruption. RAN'COROUS, a. *-us*, characterized by deep and bitter malice; malignant; spiteful. RAN'COROUSLY, ad. *-li*.—SYN. of 'rancor': enmity; hatred; ill-will; spite; malice; animosity; malignity; grudge; antipathy; malevolence; virulence.

RANDALL, *răn'dal*, SAMUEL JACKSON: statesman: 1328, Oct. 10—1890, Apr. 13; b. Philadelphia. Having received an academic education, he became an accountant in a mercantile house, and later a partner in a firm of ironmongers. He entered public life as a member of the city council of Philadelphia, in which office he served 4 years, being elected and re-elected as a whig; but his election 1858, and re-election 1859, to the state senate, he owed to the democratic party, and to that party he thereafter adhered. On the outbreak of the civil war, R. entered the milit. service as private in the first city troop of Philadelphia, which company was one of the first to respond to the call of the pres. for troops to serve 90 days. He was elected representative in congress for the 3d Penn. dist. 1862, and was re-

elected to each succeeding congress till his death. In congress in his second and succeeding terms he served on the most important committees of the house—banking and currency, retrenchment, ways and means, etc.; and almost from the first was recognized as a leader of his party in committee and in debate. In the 43d congress, the democratic minority, under the leadership of R., defeated the enactment of the Force Bill, and thereafter he was recognized as the strongest man in his party. In the 44th congress, which met 1875, Dec., R. gave way to Michael C. Kerr in the canvas for the speakership; but on the death of Kerr, 1876, R. was elected to fill the office for the remainder of that congress. He was re-elected speaker of the 45th and 46th congresses. He was an advocate of the policy of protection, therein differing from the majority of the democratic party: on that issue, when the democrats regained control of the house in the 48th congress, R. was defeated by John G. Carlisle in the speakership canvas. R. was held in respect by men of all parties for his ability and integrity.

RAN'DALL'S ISLAND: island belonging to New York, in the East river, at the mouth of the Harlem, comprising more than 100 acres, and containing the House of Refuge (under care of the Soc. for the Reformation of Juvenile Delinquents), Idiot Asylum, Child's Nursery, Children's and Infants' hospitals, and a number of other charitable institutions supported by the city. R. I. and Ward's Island, near it, have histories dating unbrokenly to the Dutch administration of Van Twiller, who bought them of the Indians. Ward's Island, then known as Great Barnes Island, was given, and R. I. (Little Barnes) was sold for the equivalent of $200, to Thomas Delavall by the English govt. after the expulsion of the Dutch. R. I. passed from Delavall through a daughter's family to Elias Pipon, who came from England 1732 and laid out a grand estate there. St. George Talbot bought it 1747 and bequeathed it 1765 to the London Soc. for Propagating the Gospel in Foreign Parts, which sold it 1772 to Capt. John Montressor, of the Brit. army. In 1784 Samuel Ogden bought it, and within a few months sold it to Jonathan Randall (whence its present name) for £2,400 (about $11,675); and 1835 the city of New York bought it of Randall's estate for $50,000, and applied it to charitable purposes.

RANDANITE, n. *ràn'dàn-īt:* a form of gelatinous soluble silica, in fine earthy compact masses, principally composed of infusorial remains, occurring near Algiers, and near *Randan,* in France, whence the name; also found in England.

RANDAZZO, *rân-dât'sō:* town of Sicily, province of Catania, at the base of Mount Etna. It crowns the summit of a low cliff of lava, and is so mediæval in its appearance that it has been likened to 'a town of the middle ages preserved as a curiosity.' Pop. (1881) 10,210.

RANDERS, *rân'dérz:* town in Jutland, chief town of the *Amt* or bailiwick of R., on the Guden, at its entrance into the Randers-Fiord, 20 m. from the mouth of the latter in the Cattegat. Though still fortified, it has declined from its early prestige and importance. Brewing, distilling, and manufacture of gloves, which are in high repute, and of stockings and cloth, are carried on. Pop. (1870) 11,354; (1880) 13,457; (1890) 16,617.

RAN'DOLPH, *ran'dulf:* town in Randolph tp., Norfolk co., Mass.; 15 m. s.e. of Boston; on the Old Colony railroad, two branches of which pass through the township. It was incorporated 1793. It has a public library, the Turner Library, which with the building was given to the town by the heirs of Col. Royal Turner, a high school supported chiefly from the income of a bequest for this purpose made by Hon. Amasa Stetson, grammar and primary schools. It manufactures boots and shoes and woolen goods. Pop. of tp. (1890) 3,946.

RAN'DOLPH, Anson Davies Fitz: publisher and author: b. Woodbridge, N. J., 1820, Oct. 18. After studying in the public schools of New York, he became a clerk in the office of the American Sunday-School Union. In 1851 he engaged in selling and publishing books in New York, which business he continued until his death. He has written for various periodicals. A collection of his poems, entitled *Hopefully Waiting, and Other Verses*, was published by request (1867), enlarged and reprinted 1885. D. New York 1896, July 6.

RAN'DOLPH, Edmund Jennings: 1753, Aug. 10—1813, Sep. 13; b. Williamsburg, Va.; nephew of Peyton R. He graduated with honor from William and Mary College, studied law, and was disinherited by his father for adherence to the patriot cause. He was aide-de-camp to Washington 1775, a member of the Va. constitutional convention 1776, and atty.gen. of the state. He was twice elected to congress, was gov. of Va. 1786–88, and a prominent member of the national constitutional convention 1787. A draft which he had prepared was not accepted, and he did not sign the constitution, though he favored its ratification by the Va. convention. He became atty.gen. of the United States 1789, and sec. of state 1794; but charges (afterward proved false) by the French minister caused his resignation the following year; and he again became one of the most prominent lawyers in Virginia.

RAN'DOLPH, John, of Roanoke: statesman: 1773, June 2—1833, June 24; b. at Cawsons, in Chesterfield co., Va.; descended from an ancient and wealthy family, and claiming the Indian princess Pocahontas as one of his ancestors. He studied a short time at Columbia College, New York, entered the profession of law, and 1799 was elected to congress, where he became distinguished for a showy sort of eloquence, wit, sarcasm, invective, and eccentricity, and for 30 years was more talked and written of than any other American politician. He was radical

and extreme in views and expressions; a zealous deist, and a violent upholder of the theory of state rights, and opponent of the new constitution of the United States. Tall and meagre, peculiar in dress and manners, he was described as a strange mixture of the aristocrat and the Jacobin. He was the democratic leader of the house of representatives; but quarrelled with Jefferson, finally separating from him 1806; and opposed the war of 1812 and the Missouri Compromise, and stigmatized the northern members who voted for it as 'dough-faces.' In 1822 and 24 he visited England, where his eccentricities attracted much notice. He represented Va. in congress 1799–1825, except two terms. In 1825 he was chosen U. S. senator from Va., and 1830 appointed minister to Russia. He died in Philadelphia. By his will, he manumitted 318 slaves, and provided for their maintenance in a free state. His will was disputed in the courts, and a verdict was returned declaring him not sane in his later years. See *Life of John Randolph*, by Garland (2 vols. New York 1850).

RAN'DOLPH, PEYTON: 1721–1775, Oct. 22; b. Williamsburg, Va.; son of Sir John R. He graduated from William and Mary College, studied law in London, and 1748 became crown atty. for Va., and a member of the house of burgesses. He resisted the demand of the crown for a fee on each land patent, and 1754 was commissioned by the house to present the case to the English ministry and obtain a repeal of the imposition. After the defeat of Braddock, he raised a force of about 100 lawyers and gentlemen, and joined the troops then fighting the Indians. He was afterward chairman of a committee which revised the laws of Va., and was also one of the directors of the affairs of William and Mary College. In 1766 he was elected speaker of the house of burgesses, and resigned the office of atty. for the crown; was chairman of the correspondence committee of the colonies 1773, pres. of the Va. convention 1774, pres. of the first continental congress, and was one of the most trusted leaders of the people in their movement for independence. He died of apoplexy in Philadelphia, where he was attending congress.

RANDOM, a. *răn'dŏm* [AS. *randun*, rushing: OF. *randon*, force, violence; *à randon*, at random: It. *randello*, a violent hurling or whistling noise in the air; *a randa*, scarcely, with difficulty: Ger. *rand*, edge, extremity]: done at hazard, or without settled aim, purpose, or calculation; left to chance; done or uttered without previous calculation: N. want of direction; chance. AT RANDOM, without external guidance; without settled aim or purpose.

RANDY, a. *răn'dĭ* [Gael. *rannda*r, discontented and violent language (see RANDOM)]: boisterous; obstreperous; violent: N. in *Scot.*, a violent scold. *Note.*—RANDI is a term of abuse applied to females in Hindustan, and used exactly in the same sense as Scot. *randy*.

RANEE, or RANI, n. *rân-ē'* [Hind. *rajnī*]: in *Hind.*, a queen or princess; the wife of a rajah: also spelled RANNEE.

RANELAGH, *răn'ē-la:* notorious haunt of London gayety in the latter half of the 18th c.; called from having been built on the site of a villa and garden of Viscount R., near Chelsea. The R. was a kind of 'Vauxhall under cover,' mainly a large amphitheatre, with orchestra in the centre, noted for banquets, balls, concerts, and other festivities. The place was opened as a public hall and promenade 1742, and was closed 1805. No traces now remain, its site being part of the Chelsea Hospital garden.

RANG: pt. of RING, which see.

RANGE, n. *rānj* [F. *rang*, order; *ranger*, to arrange or set in order: W. *rhenc*, a row, a line: It. *rangiare*, to range or set in order]: a rank; a row; a class or order; things in a line; step of a ladder; compass or extent of excursion, or space or room for it; compass taken in; command or scope, as applied to thought; an extended kitchen apparatus for cooking; a piece of wood fixed to the inside of a ship to belay the ropes; the distance to which a shot can be projected or thrown from a gun; the line a shot describes to the point where it lodges; a bolting-sieve to sift meal: V. to set or place in a row or line; to dispose in proper order; to go from one point to another, as prices; to rove at large; to lie in a particular direction; to travel about without restraint or direction; to separate the flour from the bran, as to *range* through a sieve. RANGER, n. *rānj'ėr*, a dog that beats the ground for game. RANG'ING, imp. RANGED, pp. *rānjd:* ADJ. placed in order or in rank. RANGE OF A GUN, as far as the shot from the gun will reach (see below). RANGE OF MOUNTAINS, a stretch or line of mountains.—SYN. of 'range, v.': to wander; roam; stroll; rove; ramble.

RANGÉ, a. *rānj-zhā* [F.]: in *her.*, arranged in order.

RANGE, *rānj*, in Gunnery: distance between a point on the ground vertically below the muzzle of the piece and the point on the same level at which the projectile touches in its descent. The point-blank range is when the piece is fired in a horizontal position; the range increases with the elevation; and if the air opposed no resistance, the greatest range would be attained with the piece elevated at an angle of 45°; but in practice the angle for the greatest range is found to be, on an average, a little over 30°. As the resistance of the atmosphere increases as the square of the velocity of the shot, being also in the direct ratio of its front section, while the momentum is as the velocity multiplied by the weight, it follows that a heavy shot should have a greater range than a light one; and that of two shots of the same weight, an elongated cylinder of small diameter will have a longer range than a spherical ball of greater diameter. On the other hand, from the rapid

increase in a duplicate ratio of the resistance, as compared with the initial velocity, the range increases only to a certain point, in consequence of a more rapid flight of the projectile.

The greatest ranges of projectiles known at that time made by American ordnance were measured at the Army Ordnance Proving Ground, Sandy Hook, N. J., as follows: 1887, Nov. 30: 8-inch breech-loading steel rifle; powder 113 lbs.; projectile 300 lbs.; elevation 17° 45′; range 11,000 yards. 1888, May 17: 12-inch breech-loading rifled mortar; powder 80 lbs.; projectile 630 lbs.; elevation 45°; range 10,528 yards.

By foreign ordnance: 1888, Apr. 15: English 9·2-inch breech-loading, wire-wrapped steel rifle; projectile 380 lbs.; elevation 40°; range 21,358 yards. This is known as the 'Jubilee' firing.—The statement is made in *Engineering* (London 1891, Feb. 27, p. 250), that in the firings with 12·6-inch Canet (French) steel rifles, 1891, Jan. and Feb., at the firing ground at Hoc, 'the gun was proved on this occasion to have a maximum range of 21 kilometres' = 22,966·416 yards. The maximum range of American high-power guns is equal to the foreign of the same calibre and length, but has not been recorded for a greater angle of elevation than 17° 45′, as noted above for the 8-inch rifle. To attain the maximum range would require an angle of about 42° elevation.

RANGELEY LAKES, *rānj′li lāks:* chain of lakes in Oxford and Franklin cos., in the lumber dist. of W Maine. They are connected by short rivers or straits, which form an unbroken line of water-communication of nearly 50 m. In their order from the n. they are individually called Rangeley, 1,511 ft. above sea-level, Cupsuptic, Moosetocmaguntic, Molechunkamunk or Upper Richardson, Richardson, and Umbagog, which is partly in N. H. (1,256 ft. above sea-level). The beautiful scenery and pure air of this lake region, with the fine fishing and hunting, draw great numbers of visitors.

RANGER, n. *rānj′ėr* [OF. *ramage*, the right of cutting branches in the forest, and the duty payable for the same; *ramageur*, the officer appointed to look after the woods: mid. L. *ramāgium*, the right of cutting branches in the forest—from L. *rāmus*, a branch]: an officer whose duty it is to take care of a forest or park. RANG′ERSHIP, n. the office of a ranger.

RANGIFER, n. *rān′ji-fėr* [formed in the 16th c. from F *ranche*, a rack, ladder, and L. *fero*, I bear]: reindeer; a genus of *Cervidæ*, having horns with large basal snags near crown, muzzle hairy.

RANGOON, *rāng-gōn′:* principal seaport and chief town of Pegu (q.v.); on the left bank of the Rangoon river, the e. branch of the Irrawaddy, 26 m. from the sea, lat. 16° 42′ n., long. 96° 13′ e. R. was founded or rebuilt by the great Alompra 1755. The British flag was first planted in the town 1824, May, when the Anglo-Indian troops took possession of it at the commencement of the

first Burman war. The second Burman war began with the bombardment of R. 1852, Apr. 11; and it was captured Apr. 14, by the united forces of Bengal and Madras. At the close of the contest, Pegu was annexed to Brit. India, and R. became a part of the same territory. A great change has taken place in R. under the dominion of the British, and large sums have been expended on its improvement. Excellent roads and streets now intersect every part of the town. The native town is of mean appearance, but many substantial buildings of brick or stone have been erected by the European inhabitants. R. possesses a govt. naval yard, and a patent slip for repairing ships.

R. is a stronghold of Buddhism, and on every side are gigantic monuments, that from age to age have been erected by the followers of Gautama; pagodas, temples, images, wonderful in their vastness and grotesque splendor. Of these, the most notable is the famous *Shway Dagon*, or Golden Dagon dagoba, or shrine, whose foundation is said to have been laid 2,300 years ago. It is about two m. n. of the town, on elevated ground, on an area 800 ft. square. The dagoba itself is a stupendous mass of solid masonry, tapering gradually from an octagonal base of 1,355 ft. to a spire of small circumference, which is surmounted by the sacred *tee*, or umbrella of open iron-work. The whole building is one dazzling blaze of gold, and altogether forms a most magnificent object, its magnitude and massiveness being very remarkable. This celebrated monument derives its peculiar sanctity from being the depository, according to Burman tradition, of relics of the last four Buddhas—viz., the staff of Kan-tha-than, the water-dipper of Gau-na-gon, a garment of Ka-tha-pa, and eight hairs from the head of Gautama. The shrine is surrounded by numerous temples, containing colossal images of Gautama, richly gilt, and sitting cross-legged in solemn conclave.

R., possessing continuous water-communication with the upper provinces and the Burman kingdom, is favorably situated for internal as well as for foreign commerce. There are 5 light-houses on the Burmese coast to guide vessels to the port. Teak-timber and rice are the principal exports by sea, but exports include also cotton, cutch, hides, ivory, jade, kerosene, petroleum, precious stones, shellac, and tobacco. The imports by sea comprise betel-nut, cotton twist, cotton piece goods, crockery, cutlery, hardware, silk and woolen piece goods, raw silk, spirituous liquors, and wines. The annual value of exports from R. amounts to more than $12,500,000; and this value is exceeded by the imports. The town is fortified and garrisoned. An English newspaper is published here.—Pop. (1869) 87,553; of whom 1,627 were Christians, 11,997 Mohammedans, 5,998 Hindus, and 62,054 Burmese: pop. (1881) 134,176; (1891) 181,210.

RANINE: see under RANA.

RANK, n. *răngk* [F. *rang*, order: prov. F. *renc;* W. *rhenc*, a line, a rank: Gael. *rianaich*, to set in order; *rian*, order (see RANGE)]: a row or line, as of soldiers standing abreast; grade; station or condition; class or order; status or station in society; degree of eminence or dignity; high place: V. to place abreast in a line or row; to include in a particular class or division; to place in a particular class, order, or division; to have a certain grade in the orders of civil or military life (see RANK IN THE U. S. ARMY AND NAVY): to be ranged; to be esteemed. RANK'ING, imp.: N. arrangement; order. RANKED, pp. *răngkt:* ADJ. arranged or disposed in an order or class. THE RANKS, the order of common soldiers; the common people. RISEN FROM THE RANKS, in the *army*, said of a commissioned officer who once served as a private soldier; also said of a man who has risen from a humble position to one of importance and consideration. REDUCED TO THE RANKS, in the *army*, said of a non-commissioned officer lowered to the condition of a private for some misconduct. RANK AND FILE, the whole body of common soldiers in an army, including corporals, etc. Rank and file means literally the lines of men from side to side, and from front to back—a rank being a row of men standing side by side, and a file of soldiers a line of men standing one behind another. The strength of a force is reckoned by its rank and file; the non-commissioned and commissioned officers forming the supernumerary ranks charged with the direction of the mass. TO TAKE RANK OF, to enjoy precedence over; to have the right to occupy a higher place. RANKING AND SALE, in *Scotch law*, action whereby the land or heritable property of an insolvent person is sold, and the proceeds divided among the creditors, for which purpose it is necessary to rank the creditors according to legal priority.—SYN. of 'rank, n.': line; row; range; class; division; order; degree; grade; eminence; excellence; dignity; station; position.

RANK, a. *răngk* [F. *rance;* Dut. *ranst;* Ger. *ranzig*, musty (see RANCID)]: musty; strong-scented; overrich or offensive from excess; high or strong tasted; excessive, as a *rank* coward. RANK'LY, ad. *-lĭ*. RANK'NESS, n. *-nĕs*, rancidness; rank smell; strong taste.

RANK, a. *răngk* [AS. *ranc*, strong in growth, fruitful: Dan. *rank*, erect: Icel. *rakkr*, straight; *rammr*, robust, strong: Ger. *ranke*, a tendril, branch: Norw. *rangla*, to revel, to riot]: strong or luxuriant in growth; causing strong growth; vigorous; excessive in any quality; raised to a high degree; extreme; coarse; violent; strong; barefaced; in *OE.*, lustful: AD. strongly; fiercely. RANK'LY, ad. *-lĭ*, with vigorous growth; coarsely; grossly. RANK'NESS, n. *-nĕs*, the condition or quality of being rank; luxuriance; vigorous growth; excess. Rankness, as an excessive luxuriance of growth in vegetables, is as unfavorable as its extreme opposite to their health and productiveness. It is caused often by injudicious

manuring, and is most frequent in moist seasons. The decay of mushrooms in pastures, as in Fairy Rings (q.v.), sometimes produces a rankness of grass which causes all animals to refuse it; such herbage abounding to an unusual degree in Chlorophyl (q.v.), but very deficient in qualities which render herbage most palatable and nutritious to cattle. Rankness in grain-crops is attended with diminished production of grain, the flowers often proving abortive, and with much increased liability to attacks of parasitic fungi. In fruit-trees, it displays itself, even when the soil is only a little too rich, in tendency to produce shoots and foliage, instead of blossoms and fruit; and is to be counteracted by withholding manure, by root-pruning, or by cutting away portions of bark. In wall-trees, deep cuts may even be made into the wood. Trees in standards this would involve danger of destruction by the next storm.

RANK IN THE UNITED STATES ARMY AND NAVY: military or naval grade of officers on a comparative scale. For the various grades, see PROMOTION, in the ARMY AND NAVY.

Relative Rank.—Line officers in the milit. and naval services hold rank relatively as follows:

ARMY.	NAVY.
General.	Admiral.
Lieut.-gen.	Vice-admiral.
Maj.-gen.	Rear-admiral.
Brig.-gen.	Commodore.
Col.	Capt.
Lieut.-col.	Commander.
Maj.	Lieut.-commander.
Capt.	Lieut.
First lieut.	Master.
Second lieut.	Ensign.

Relative rank of non-combatants is the grade or position which they are entitled to take among their combatant brethren. Their relative rank carries with it all precedence and advantages attaching to the milit. rank with which it corresponds, and regulates rates of lodging, number of servants, rations of fuel and light (or allowances in their stead), and share of prize-money; but confers no right to command, and does not entitle the holder to salutes from ships or fortresses, nor to the turning out of guards. For the relative rank of certain civil departments, see their respective titles (MEDICAL DEPARTMENT: PURVEYOR: ETC.).—In the army a chaplain ranks as capt. of cavalry; the officer in charge of the public buildings and grounds in Washington as col.; supt. of the U. S. Milit. Acad. as col.; profs. of more than 10 years' service at the acad. as col.; profs. of less than 10 years' service as lieut.-col.; asst. profs. as capt.; asst. surgeons, 1st 5 years 1st lieut., after 5 years capt.; paymaster-gen. as brig.-gen.; asst. paymasters-gen., col., deputy paymasters-gen., lieut.-col.; paymasters, maj.; and aides-de-camp to maj.-generals, capts., to brig.-generals, lieut.—In the navy the chiefs of the bureaus of medicine and surgery, provisions and

clothing, steam-engineering, and construction and repair, hold the relative rank of commodore while occupying the offices, and have respectively the titles surgeon-gen., paymaster-gen., engineer-in-chief, and chief constructor. Chaplains rank as capts.; profs. of mathematics as capts., commanders, and lieuts., according to place and character of service; naval constructers as capts., commanders, lieuts., and lieuts. of the junior grade; civil engineers as capts., commanders, lieut.commanders, and lieuts.; and heads of depts. in the Naval Acad. as commanders, lieut.commanders, lieuts., and chief engineer.—The commissioned officers of the U. S. marine corps rank with officers of like grades in the army.

RANKE, *rân'kĕh*, LEOPOLD VON: distinguished modern German historian: 1795, Dec. 21—1886, May 23; b. Wiehe, in Thuringia. He was educated for a schoolmaster. In 1818 he was appointed rector of the gymnasium at Frankfurt-on-the-Oder; and 1824 published at Berlin his first work, *Geschichte der Roman. und German. Völkerschaften von* 1494–1535. It attracted considerable notice; and in the following year he was called to Berlin as extraordinary prof. of history at the univ., where his lectures soon began to be numerously attended. About this time his attention was directed to the historical value of the reports sent home by the Venetian ambassadors at different European courts during the 16th and 17th c.; and the result of his studies and investigations among these was *Fürsten und Völker von Südeuropa im* 16. *und* 17. *Jahrh.* (Berl. 1827), in which the affairs of Turkey and Spain are specially handled. Immediately after the publication of this work, he commenced a four years' tour through Europe, examining the archives of the different nations. The fruit of his varied researches partly appeared in his *Serbische Revolution* (Berl. 1829), *Verschwörung gegen Venedig im J.* 1688 (Berl. 1831), and *Vorlesungen zur Geschichte der Ital. Poesie* (Berl. 1837); but much greater than any of these was *Die Röm. Päpste, ihre Kirche und ihr Staat im* 16. *und* 17. *Jahrh.* (3 vols. Berl. 1834–36; 3d ed. Berl. 1844–5), a work which, for its important conclusions regarding the character and policy of the papacy, many of which it may be said to have placed almost beyond controversy, was not only received with unbounded applause in Germany, but was translated again and again in Holland, England, France, and America, and ranks as one of the most widely circulated and influential histories of modern times. It was followed by *Deutsche Geschichte im Zeitalter der Reformation* (6 vols. Berl. 1839–47), considered in Germany his most finished and thorough production, and in whose composition he was enabled to avail himself of many documents never before published or used. In a still higher degree than in his earlier writings, we find displayed here his skill in grouping events together in a vivid and intelligent manner, placing them before the eye of the reader in their whole

significance, with all their causes, relations, and consequences. R.'s next effort, *Neun Bücher Preuss. Geschichten* (1847–8), remodelled and re-issued 1875 under the title *Genesis des Preussischen Staates*, may be regarded as continuing his history of Protestantism, and was worked up from the Prussian historical archives, opened to literature for the first time. The stormy period of 1848 found him in the Frankfurt parliament; but he did not acquire distinction in that arena of babbling and incompetent patriots, and soon betook himself again to more familiar and more valuable labors. His *Franz. Geschichte vornehmlich im* 16. *und* 17. *Jahrh.* (1852–57) is an admirable work, full of new information and enlightened views; and his *exposé* of the reign of Louis XIV. is put, even by French critics, on a level with that of Voltaire. Still later are his *Englische Geschichte vornehmlich im* 16. *und* 17. *Jahrh.* (1859–67, Eng. trans. 1875); *Die Deutschen Mächte und der Fürstenbund*; and memoir of *Hardenberg* (1877). A collected ed. of his works was begun in 1874. R. became ordinary prof. 1834, and was ennobled 1866. He trained a numerous body of historical students.—R.'s library was secured at large cost for Syracuse Univ., N. Y., and was a welcome addition to the literary treasures of this country.—His three brothers, FRIEDRICH HEINRICH R. (b. 1797), KARL FRIEDRICH R. (b. 1802), and ERNST R. (b. 1814), also have risen to eminence as churchmen and scholars.

RANKINE, *rank'in*, WILLIAM JOHN MACQUORN, LL.D., F.R.S.: civil engineer and physicist: 1820, July 5—1872, Dec. 24: b. Edinburgh. He studied engineering and physical science in the Edinburgh Univ., and at the age of 22 published *An Experimental Inquiry into the Advantages of Cylinder Wheels*, which attracted the attention of mechanicians. His numerous text-books of mechanical science—*Steam-Engineering, Machinery and Millwork, Civil Engineering, Applied Mechanics*, etc.—were quickly recognized as works of standard authority and have passed through many editions. He wrote also an elaborate treatise on *Shipbuilding, Theoretical and Practical*. He was one of the founders of the modern science of Thermodynamics (q.v.). His contributions to the *Transactions* of the London Royal Soc. number 150, discussing most of the profoundest questions of physical theory; his papers on *Elasticity* and *Waves* rank high among modern developments of mathematical physics. R. was prof. of civil engineering in the Univ. of Glasgow from 1855 till his death.

RANKLE, v. *răng'kl* [from Eng. *rank*, vigorous, excessive in any quality]: to fester; to be inflamed; to become painfully disquieted or irritated in mind. RAN'KLING, imp. *-kling*: N. a festering: deep and active irritation of mind. RAN'KLED, pp. *-kld*.

RANNEE: see RANEE.

RANNOCH, *răn noch*, MOOR AND LOCH: in the n.w. extremity of Perthshire, Scotland.—The Moor, with mean elevation of about 1,000 ft. above sea-level, is a wild and dreary waste, 28 m. long, 16 m. broad, girdled by distant and gloomy mountains.—Loch R., stretching e. from the Moor, about 9 m. long by 1 to 2 m. broad, is surrounded by mountains, and contains two islands.

RANNY, n. *răn'nĭ* [L. *arānĕus mus*, a kind of small mouse]: the shrewmouse.

RANSACK, v. *răn'săk* [Icel. *rannsaka*, to ransack—from *rann*, a house; *saekia*, to seek: Sw. *ransaka*, to search for stolen goods: comp. Gael. *rannsaich;* Manx, *ronsee*, to search, to scrutinize]: to search for plunder; to plunder; to search thoroughly; to rummage; to pillage. RAN'SACKING, imp. RAN'SACKED, pp. *-săkt:* ADJ. plundered; pillaged; searched thoroughly.

RANSOM, n. *răn'sŭm* [F. *rançon;* Ger. *ranzion*, ransom—from L. *redemptiōnem*, a purchase back—from *re*, back; *emĕrĕ*, to buy]: price paid for the freedom of a prisoner or slave, or for the restitution of goods taken by an enemy (see below): a fine paid for pardon, or in lieu of corporal punishment: V. to free from captivity, slavery, or punishment, by the payment of a price; to redeem from the bondage or punishment of sin; to redeem from confiscation. RAN'SOMING, imp. RAN'SOMED, pp. *-sŭmd.* RAN'SOMER, n. *-ẽr*, one who ransoms. RAN'SOMLESS, a. *-lĕs*, incapable of being ransomed.

RAN'SOM: price paid by a prisoner of war, or paid on his behalf, in consideration of his being granted liberty to return to his own country. In early times, when armies received little or no regular pay, the soldier looked for his reward in the booty that he might capture, and this booty included the bodies as well as the chattels of the vanquished. The conqueror had the option of slaying his prisoner; but for his profit, he would make him his slave, or sell him into slavery. The transition would be natural to accepting compensation from the prisoner himself, and setting him at liberty. In feudal warfare, the ransoms formed a large portion of a soldier's gains; those for persons of low degree belonging to the individual captors; but those for princes or great nobles, to the king. Ransoms were sometimes of large amount, more than the immediate family of the captive could pay. His retainers were then required by feudal usage to contribute; as in the case of redeeming King Richard I. for £100,000, when 20 shillings were assessed on every knight's-fee, and the clergy subscribed liberally. King John of France was ransomed for £500,000, payable in instalments.—In modern warfare, where the fighting is by professional soldiers, pecuniary ransoms are almost unknown, freedom being granted to prisoners in exchange for others of corresponding rank captured on the opposite side.

RANT, v. *rănt* [Ger. *ranzen*, to move noisily about: Dut. *randen* or *randten*, to be foolish, to rave]: to rave or swagger in violent or extravagant language; to be boisterous and noisy in speech or declamation: N. boisterous empty talk or declamation. RANT'ING, imp.: ADJ. noisy. RANT ED, pp. RANTER, n. *rănt'ĕr*, a noisy talker; a boisterous preacher. RANT ERS, n. *-ĕrz*, a term first applied in contempt to a fanatical religious sect which arose in 1645 -afterward applied to the Primitive Methodists on their secession from the Wesleyan Methodists. RANT ISM, n. *-izm*, the tenets and practices of the Ranters.

RANTOUL, *răn'tôl*, ROBERT, Jr.: lawyer and politician: 1805, Aug. 13—1852, Aug. 7; b. Beverly, Mass. He graduated at Harvard 1826; was admitted to the bar 1825; practiced law in Salem, S. Reading, and Gloucester; was member of the state legislature 1834–38; and then established a democratic weekly newspaper at Gloucester. Having removed to Boston, he procured the discharge of the Bootmakers' Union, indicted for conspiracy, on the ground that, the end being lawful, combination to secure it could not *per se* be unlawful. R. was federal dist. attorney for Mass. 1845–49. When Daniel Webster resigned his senatorship to become sec. of state, R. was appointed to the vacancy for the 9 days of Webster's term that remained, 1851. The same year he was elected representative in congress by a coalition of democrats and free-soilers. He was prominent in the agitation against the fugitive slave law.

RANULA, *răn'ū-lă* [see RANA]: in general, a tumor situated under the tongue. Dermoid cysts, containing hair, sebaceous matter, teeth, and bone, may be found here, or the tumor may be due to cyst-formation in a branchial cleft. More properly, R. is a retention cyst of a salivary gland, and especially of the anterior sublingual glands of Blandin Nuhn. True ranulæ contain a glairy, faintly yellow, mucoid fluid, without ptyalin or potassium sulphocyanate, which latter are characteristic of saliva. The tumor is globular, bluish, on account of distended veins, and fluctuating slightly. The tumor first appears a little to one side of the frenum, and, if large, may be felt below the chin. The name is derived from a fancied resemblance to a frog's mouth. Except by secondary degeneration, ranulæ are not malignant, though the mere obstruction has produced suffocation. Treatment consists in extirpation, if practicable. If the distention is due to a calculus, this must be dissected out. Thin-walled cysts cannot be entirely removed by dissection. A large piece of the wall should be removed or, better, after opening freely, a flap from the anterior wall should be sutured to the posterior, so as to secure the obliteration of the cavity as the two parts unite.

RANUNCULACEÆ, *ra-nŭn-kū-lā'sē-ē:* natural order of exogenous plants, mostly herbaceous, rarely shrubs; natives generally of cold damp climates. Some are found within the tropics, but almost exclusively in very elevated situations. The number of known species is about 1,000. They occur in all quarters of the globe, but most abundantly in Europe. The leaves are generally much divided, and have dilated sheathing stalks. The calyx is of 3–6 deciduous hypogynous sepals; the corolla of 3–15 hypogynous petals, in one or more rows, sometimes assuming very remarkable forms, as in larkspur, aconite, and columbine; rarely absent, in which case the sepals are gayly colored. The stamens are usually numerous; the carpels are numerous, one-celled, sometimes united into a single many-celled pistil; the ovary with one or more ovules. The fruit either consists of dry achenia, or is berry-like or follicular.—Acridity is the prevailing character of the order, and the leaves of some species readily produce blisters; but this property disappears when they are dried or heated. Many are narcotic and poisonous; some are used in medicine—e.g., aconite and hellebore. The seeds of *Nigella sativa* were formerly used instead of pepper. The fruit of the May Apple or Wild Lemon (*Podophyllum peltatum*) of N. America may be eaten, but is very acid.—Many of the order produce flowers of great beauty—e.g., some species of *Ranunculus* (q.v.), *Anemone* (q.v.), *Larkspur* (q.v.), *Peony* (q.v.), *Columbine* (q.v.), *Clematis* (q.v.), etc.

RANUNCULUS, n. *ra-nŭn'kū-lŭs* [L. *ranun'cŭlus*, a little frog—from *rānă*, a frog: It. *ranuncolo:* F. *renoncule*]: genus of plants of nat. order *Ranunculaceæ;* having five sepals; five petals, with a nectariferous pore at the base of each petal, often covered with a scale; many stamens situated on a receptacle, and germens accumulated into a head. The species are numerous, herbaceous plants, mostly perennial. Some adorn meadows with their yellow flowers, familiarly known as *Kingcups* or *Buttercups;* others, known by the name *Crow-foot* or *Frog's Foot,* are troublesome weeds in gardens and pastures. Many, as the Spearworts, are found chiefly in moist places, and some are altogether aquatic, covering the surface of ditches, ponds, and rivers, where the water is shallow, with a carpet of verdure exquisitely studded with beautiful white flowers. The genus is named from the species which grow where frogs abound.—One species, the ASIATIC R., or GARDEN R., exclusively the R. of florists, native of the Levant, has been cultivated in Europe almost 300 years. From clusters of small tubers it sends up several bipartite leaves, and an erect branched stem with terminal flowers which, in the cultivated varieties are often double or semi-double, yellow, white, red of various shades, or of mixed colors, very brilliant, and an inch and a half to two inches and a half in diameter. Cultivated varieties are extremely numerous. The R. is propagated by seed, by offset tubers, or by dividing

the clusters of tubers. The roots are often taken up in summer after the leaves die, and kept in a dry place till the beginning of the ensuing winter or spring. Protection by frames and glasses, shading from strong sunshine, and other such means, are employed to increase the beauty of the flowers. The R. thrives in a free and rich soil.—Double-flowered varieties of some other species, with taller stems and smaller white or yellow flowers, but more commonly blue, are cultivated in flower-gardens, sometimes under the name *Bachelors' Buttons*.—The acridity of many species of R. is such that the leaves, bruised and applied to the skin, produce

Garden Ranunculus.
(From a drawing by Holland.)

blisters; and those of R. *sceleratus* are said to be used by beggars to cause sores in order to move compassion. *R. thora*, Swiss species, is of extreme acridity, and hunters were accustomed in former times to poison darts and arrows with its juice. Water distilled from the leaves of *R. flammula* is an active and powerful emetic, producing almost immediate vomiting, and of advantage in cases of poisoning.—Yet the leaves of *R. ficaria*—sometimes in Europe called *Pilewort* and *Lesser Celandine*—are capable of being used as a pot-herb. Pastures in which *R. acris*, *R. repens*, etc., are very abundant, are injured by them, and they should be diligently grubbed out; they are supposed to give an unpleasant taste to milk and butter; but it is thought probable that a moderate mixture of these plants with the other herbage is even advantageous, acting as a condiment. Their acridity is lost in drying, and they are not injurious to hay. The small tubers of Pilewort, or Lesser Celandine, are used for cure of hemorrhoids; but their acridity also disappears when they are boiled, and they are then a pleasant article of food.

RANZ DES VACHES, *rângss dā vâsh* (Ger. *Kuhreigen*): name of certain simple native melodies of the Swiss Alps, usually sung by the herdsmen, and played by them when driving their herds to and from the pasture, on an instrument called the *Alp-horn*, consisting of a wooden tube somewhat bent, about three ft. long, widened out into a bell, and bound by a pitched cord. The associations of pastoral life recalled by these airs to the Swiss in foreign countries have been said to produce that unaccountable longing for home, or *nostalgia*, notable among Swiss soldiers abroad, so that the bands of Swiss regiments in foreign service were prohibited from playing the R. des V. The Emmenthal, Entelbuch, the Bernese Oberland, the Grisons, Appenzell, and other pastoral districts of Switzerland, have each their respective R des V. A collection of these with other Swiss melodies (*Sammlung von Schweizer Kuhreigen und Volksliedern*) was pub. at Bern 1818: these airs are also in the *Allgemeines Schweizer Liederbuch*, 1851. The R. des V. of Switzerland are ruder in character than the mountain melodies of the Tyrol, with which they are sometimes confounded.

RAP, n. *răp* [Sw. *rapp*, a stroke, a blow: Dan. *rap*, quick, brisk: Manx, *raip*, to rend or tear: Gr. *rapizō*; Gael. *rap*, a noise: of imitative origin]: a quick sharp blow; the noise caused by a blow; a knock: V. to strike with a quick sharp blow; to knock. RAP'PING, imp.: N. a noise made by knocking. RAPPED, pp. *răpt*. RAP'PER, n. *-pĕr*, same as *knocker*, which see. TO RAP OUT, to utter or throw out with rapidity or vehemence.

RAP, v. *răp* [Dut. *rapen*, to snatch away: L. *rapĕrĕ*, to seize and carry off: F. *rapt*, a taking by violence, abduction]: to seize and bear away, as one's mind or thoughts; to raise to ecstasy or rapture; to snatch by sudden violence. RAP'PING, imp. RAPPED, or RAPT, pp. *răpt*, transported; ravished: ADJ. enraptured.

RAP, n. *răp* [Scot. *rap*, a cheat, an impostor, a counterfeit coin: Gael. *rap*, a bad half-penny: a counterfeit coin formerly used in Ireland as small change]: *familiarly*, the smallest coin; a half-penny; money in general, as, I haven't a *rap*, I don't care a *rap*.

RAPACIOUS, a. *ră-pā'shŭs* [It. and F. *rapace*, rapacious—from L. *rapax* or *rapācem*, greedy of plunder—from *rapĕrĕ*, to seize]: given to plunder; subsisting on prey; voracious; ravenous; greedy of gain; extortionate. RAPA'CIOUSLY, ad. *-lĭ*. RAPA'CIOUSNESS, n. *-nĕs*, or RAPACITY, n. *ră-păs'ĭ-tĭ* [F. *rapacité*—from L. *rapacitātem*]: the quality of being rapacious; the act or practice of seizing by force; excessive greediness.

RAPALLO, *rä päl'lō*: maritime town of n. Italy, province of Genoa, 17 m. e. of the city of Genoa. Its chief object of interest is the Sanctuary of the Madonna, or the Monte Allegro, erected 1557. R. is a thriving commercial town, and has manufactories of wax, soap, and laces in thread and in cotton: it has fisheries of coral and tunny. Pop. 5,350.

RAPAREE: see RAPPAREE.

RAPE, n. *rāp* [F. *râpe*, stalks and husks of grapes, grapes put among spoiled wine to mend it: Dut. *rapen*, to gather together, to collect: comp. Gael. *raip*, filth, refuse]: fruit plucked from the cluster; the refuse stalks and skins of raisins used in making a kind of wine; the refuse grapes in the wine-press.

RAPE, n. *rāp* [Norw. *repp*; Icel. *hreppr*, a district: comp. Sc. *rip*, a rope, a measure of length]: a division of the county of Sussex.

RAPE, n. *rāp* [F. *rapt*, a ravishing, rape: Dut. *rapen*, to snatch away: L. *rapō*, I seize or snatch]: a carrying away by violence; sexual intercourse with a woman forcibly and against her will: V. to commit a rape; to ravish. RA'PING, imp. RAPED, pp. *rāpt.—Rape*, as a crime, is the having carnal knowledge of a woman against her consent and by force. The essence of the offense is that force be used; and it is immaterial what is the age of the woman, and whether she is married or single, chaste or unchaste. The only difference caused by the habitual unchastity of the woman is that in such a case it is less easy to satisfy the jury that the element of consent was wanting. The two elements of R. are the carnal knowledge and the force used. As to the element of resistance on the part of the woman, or force on the part of the man, several niceties often occur in the application of the law, from the great variety of circumstances attending this crime. With regard to an idiot woman, it has been held that it is not necessary to prove resistance on her part, and that the crime may be committed though she made no resistance. If consent be extorted by fear and threats, or if drugs or drink be administered so as to stupefy or overpower, or where several men join together, and resistance is useless, this is the same as using violence to overpower the woman. In a case, however, where force is used in the first instance, but the woman afterward in some degree consents, the crime of R. will not be committed, though the evidence may establish the crime of assault. Some difficult cases have occurred with reference to married women who have been beguiled by men personating their husbands, and so been, in a certain sense, cheated out of their consent. Such an offense was not accounted R. by the courts, either in England or Scotland, until it was declared to be so by a clause in the Criminal Law Amendment Act (1885).

One of the important circumstances attending the crime of R. is the mode of proof, and in this respect it

differs from other crimes. It is held to be almost essential, as corroboration of the woman's story, that, if her cries of resistance were not heard, at all events she should have, immediately after the offense, complained on the first opportunity to her friends or relations. It is not allowed to give in evidence the particulars of such complaint, but merely the fact that she made a complaint against some person. Unless this important particular be proved, her evidence is looked on with great suspicion, and may be discredited by the jury, unless there were peculiar circumstances to account for lack of such complaint. One of the common defenses to a charge of R. is the unchastity of the woman, the object being to render it unlikely that she did not consent, and hence it is in practice considered a proper question for the prisoner's counsel to put to her, whether she had not had connection with the prisoner before or with other men; but at the same time she is cautioned by the judge that she is not bound to answer such questions unless she likes. If, however, she denies the accusation, witnesses may be called to contradict her on that point.

By statutes in all the states, R. is a felony punishable by severe penalties; in some states the penalty being as high as imprisonment for 20 years. R. can be committed only when there is a physical capability in the perpetrator, but one not capable of committing the crime may become guilty of it by aiding another who is; in some states a boy under 14 years of age may be convicted if proved to have arrived at puberty. But there must be clear proof of capacity by affirmative evidence. In some states a boy under 14 is conclusively presumed incapable of the crime, whatever may be the fact; and he cannot be convicted of the attempt. Generally throughout the states the puberty of the female is not an essential fact, though there are some exceptions to this proposition. In most of the states any sexual penetration, however slight, is sufficient to complete the crime. Illicit intercourse obtained by fraud without force, or the intent to use force, is not rape. There are several other crimes, all made felonies by the statutes of the different states, akin to the crime of R., but the punishment of which is not so severe, not generally exceeding ten years' imprisonment: thus a person who by force or duress compels a woman to marry him or to marry any other person, or to be defiled, is guilty of such a crime; or a person who takes or employs a female under the age of 16 for the purpose of prostitution, or, not being her husband, for the purpose of sexual intercourse, or without the consent of her father or mother, or other person having charge of her, for the purpose of marriage, or who entices an unmarried female of previous chaste character into a house of ill-fame for prostitution, or, being a parent of a female under 16, consents to her being taken or detained for illicit intercourse, is guilty of the crime of abduction.

Generally no conviction for R. or any of these kindred crimes can be had on the uncorroborated testimony of the female who has been wronged.

RAPE, n. *rāp*, or COLESEED [L. *rāpum*, a turnip, rape: Ir. *rapa*: Bohem. *repa*: Russ. *ríepa*: Gr. *rhapus*], (*Brassica napus*): biennial plant related to the Swedish turnip and cēdza, but having a slender root and more numerous leaves. It is largely grown in Europe for the seeds, which produce a large quantity of oil used for lamps and machinery, and are also fed to birds; and for the stalks and leaves, which are used as green forage; and it is grown in gardens for salad. The cake left after the oil is expressed from the seeds is to some extent fed to sheep and cattle; but as it often contains weed seeds, which are injurious, it is used more as a fertilizer: it contains considerable nitrogen and a little potash and phosphate of lime. R. grows on a great variety of soils. In rich ground it reaches a height of three to five ft., and gives large crops; but when the seed is ripened it is quite exhausting to the land, and in England its cultiva-

Rape (*Brassica napus*):
a, *silique*.

tion, on some farms, is prohibited by the terms of the lease. It is comparatively hardy and has been tested successfully in N. Y. and New England. There are two kinds, the winter and the spring. Where it is hardy the winter sort furnishes excellent food for sheep and cattle from May to Aug. It grows quickly after feeding. When properly grown and allowed to mature, it produces 40 to 50 bushels of seed per acre; but as the lower pods ripen sooner than the upper, there is some loss in securing the crop. The plants are cut with a sickle, when

moist with dew or rain, and are threshed as soon as dry. The seed is thinly spread on a floor and often stirred to prevent heating. When thoroughly dry it is crushed in a mill and the oil extracted by pressure. The stalks are sometimes fed, and often burned, though they are of value for manure. The plant is sometimes grown specially to plow into the land as a fertilizer (see MANURE—*Green Manure*). When grown for seed the sowing is done in drills, late in summer or early in autumn. Two or three lbs. of seed per acre are sufficient. Weeds are to be kept down by cultivation. When grown for forage a peck of seed is sown broadcast. Flowers appear in May and June, and the seed ripens in July and Aug. Only a small quantity is grown in this country, but it is thought that it would be a good forage crop in many states. The seed is offered by dealers, in small lots, for 25 to 30 cts. per lb. When green the composition of the plant is as follows: water, 87 per cent.; albuminoids, 3·13 per cent.; carbohydrates, 8·20 per cent.; ash, 1·60 per cent. When dry the plant contains 24·19 per cent. of albuminoids, a much larger proportion than either turnips, beets, or carrots. RAPE-CAKE, compressed refuse of rape-seeds after expression of the oil. RAPE-OIL, oil expressed from the rape seeds. RAPE-SEED, compressed seeds of the rape after the oil has been extracted.

RAPHAEL, *răf'a-ĕl*, or RAFFAELLO SANTI, *râf-fâ-ĕl'lō sân'tē* (or SANZIO, *sân'ze-o*): called by his countrymen *Il Divino*, 'the Divine,' and ranked by almost universal opinion as the greatest of painters: 1483—1520, Apr. 6; b. Urbino, Italy. In 1497, after the death of his father, Giovanni Santi, his first instructor, from whom R. seems to have derived much of his sentiment and grace in art, he was placed under the most distinguished painter of the period, Pietro Perugino, then engaged on important works in the city of Perugia. In 1504 R. visited Florence, and improved his style by studying composition and expression in the works of Masaccio, and color and effect in those of Fra Bartolomeo. He seems to have lived in Florence till 1508, and then to have removed to Rome. His celebrated frescoes in the Vatican and numerous important works were then commenced. Pope Julius II., R.'s early patron, died 1513; but his successor, Leo X., continued R.'s services, and kept his great powers constantly in exercise. The works of R. are generally divided into three classes: his first style, when under the influence of Perugino's manner; his second, when he painted in Florence 1504–08; and his third style, distinguishable in his works executed after he settled in Rome. Each of these styles has its devoted admirers. Those who incline to art employed in the service of religion prefer the first manner, as embodying purity and religious feeling. His last manner, perfected when the taste for classical learning and art was strongly excited by discovery of numerous valuable works of the classic period, is held by many connoisseurs as correctly embodying the highest art; while his middle or Florentine style is admired by some as exemplifying his powers freed from what they deem the rigid manner of Perugino, and untainted by the conventionalism of classic art. In all these different styles, he has left works of great excellence. *The Coronation of the Virgin*, in the gallery of the Vatican, and the *Sposalizio*, or Marriage of the Virgin, in the Brera Gallery at Milan, belong to the first period. The *St. Catharine* in the National Gallery, London; *The Entombment* in the Borghese Gallery, Rome; *La Belle Jardinière* in the Louvre—belong to his second period. The *St. Cecilia* at Bologna; the *Madonna di San Sisto* at Dresden; the famous 'Cartoons' now at South Kensington (see CARTOON); *The Transfiguration*; and all the Vatican frescoes but one—are in his third manner. The *Ansidei Madonna*, bought from the Blenheim Collection for the Brit. National Gallery 1884 at a cost of £70,000, is one of the very noblest works of R.'s early manhood, and belongs to a transition time between the first and second periods.

Raphael was invited to Rome by a fellow-townsman, Bramanté, then chief architect of St. Peter's Church, in course of erection. Rome had been made by the popes a home of many artists. Raphael was immediately recognized as a leader, and he soon found admiring patrons in

Pope Julius II. and others, especially the rich banker Augustino Chigi, whose house he beautified with frescoes, including the *Triumph of Galatea*, and scenes from a romance of Cupid and Psyche; his private chapel also, S. Maria del Popolo, with pictures executed in mosaic. A series of rooms in the Vatican had been adorned by noted artists, but Julius II. directed the frescoes to be erased and their places filled by Raphael, who, however, saved some of them, by Perugino, and had some of Piero della Francesco's portraits copied before the destruction. In one of the rooms, called *Stanza della Signatura*, he painted the so-called *Disputa*, or Controversy—a grand panoramic representation of the hierarchy of the church on earth and in heaven, the angelic figures equal to any of his celestial portrayals. The wall opposite has his *School of Athens*, representing earthly knowledge, with figures of Plato, Aristotle, and other philosophers, also portraits of himself and Perugino; and on the ceiling are medallion personifications of Theology, Science, Justice, and Poetry. Among his latest works was *St. Michael and the Devil*, 1518, now in the Louvre; also the celebrated tapestry cartoons of which 7, cut into strips to be used in a loom, were rescued by Rubens for Charles I., and are now in the South Kensington Museum; the entire 10, illustrating the Acts of the Apostles, had been worked in tapestry at Brussels, and were intended for the Sistine Chapel, but one set is now in the Vatican. A peculiar interest attaches to his *Transfiguration*, on which he was at work at the time of his death. Cardinal Giulio de' Medici, afterward known as Clement VII., had ordered two altar-pieces; one, by Sebastiano del Piombo, was the Resurrection of Lazarus; and Raphael intended to paint as the companion piece the Resurrection of Christ, but changed his subject to the Transfiguration. After his death, his body lay in state beside this picture, which was subsequently bequeathed to the monks of S. Pietro in Montorio, and, later, seized by Napoleon I.

The marvel is that Raphael accomplished such a vast amount of excellent work, in almost every kind of material, from exquisitely finished pieces comparable to miniatures up to largely and boldly treated frescoes, and ranging through all subjects and through all the styles of his rapid development—all in less than a score of working years. The wonder is increased when we find that, with all this, he, in common with many of the old masters, practiced many arts. He was appointed chief architect of St. Peter's after the death of Bramanté, and some edifices he is known to have designed. He was also a sculptor, as the admired statue of Jonah seated on a sea-monster, in the Chigi Chapel, bore witness. He designed silver censers and salvers; tarsia (wood) and other mosaic work; and wood-carvings, such as the excellent doors executed by his pup'l Barile. His personal beauty, gentleness, and now sufficiently proven goodness of character, have also consecrated his name. He

died at Rome. His body rests, as he desired, in the Pantheon, near an altar which he endowed with an annua. chantry. In 1883 the 4th centenary of his birth was celebrated in his native Urbino. For notice of some of his famous Madonnas, see MADONNA.—See PAINTING: also works on R., by Müntz (1880), and by Crowe and Cavalcaselle (1883).

RAPHAELESQUE, a. *răf-ā-ĕl-ĕsk′:* like Raphael; in the manner of Raphaelism. RAPH′AELISM, n. *-izm*, the principles carried out in the paintings of Raphael, who idealized his characters rather than represented them as they were. RAPH′AELITE, n. *-it*, one who adopts the principles of Raphaelism.

RAPHANIA, *ră-fā′nĭ-a*, or ERGOTISM, *ėr′gŏt-izm:* disease much more prevalent centuries ago than at present. It is defined as 'a train of morbid symptoms, produced by the slow and cumulative action of a specific poison peculiar to wheat and rye, and which gives rise to convulsions, gangrene of the extremities, and death.' It has been described under various names—e.g., epidemic gangrene. The name R. was given to it first by Linné, who thought the morbid symptoms were dependent on the admixture of *Raphanus Raphanistrum* or jointed charlock, with the wheat used as food. It was suspected, as early as the end of the 16th c., that the disease was due to the development of a fungus on the grain; this fact is now established beyond doubt, though some writers hold (like Linné) that this morbid state is produced also by admixture of poisonous plants, especially *Lolium temulentum*, or darnel, with the grain. Although rye is the ordinary seat of the poisonous fungus, wheat, rice, and other grains are liable to be similarly affected, and to produce similar results. For account of the fungus, see ERGOT.

There are two forms of the disease—spasmodic and gangrenous. The spasmodic form begins with tingling or itching of the feet and hands, sometimes of the head. Violent contractions of the hands and feet, giving rise to intense pain in the joints, are a common symptom. The head is much affected, the patient complaining of drowsiness, giddiness, and indistinct vision. If coma or epileptic convulsions supervene, there is little hope of recovery. The appetite is usually enormous; spots like those of purpura appear on the face, and there are seldom any signs of improvement for weeks. The gangrenous form begins with extreme lassitude, and is accompanied by some febrile disturbance. The extremities are painful, cold, almost insensible, and not readily moved; and after a varying time, gangrene supervenes.

In treatment, the first thing to do is to replace the poisonous flour by easily digested, nourishing, wholesome food. The pain must be relieved by opiates, the blood purified by administration of chlorate of potash, and the general tone of the system improved by tonics

—e.g., preparations of iron, bark, etc. In the spasmodic form, warm baths and gentle friction would probably prove serviceable. Whatever be the form of treatment adopted, the mortality in the gangrenous form is usually 90 per cent. The spasmodic form is much less destructive.

RAPHANUS, n. *răf'an-ŭs* [L.—from Gr. *raphanos*, a radish]: radish; the typical genus of *Raphanidæ* or *Raphaneæ*.

RAPHE, n. *rā'fē* [Gr. *rhaphē*, a seam—from *rhaptein*, to stitch together]: a term applied to parts which look as if they had been sewn together; in *seeds*, the channel of vessels which connects the chalaza with the hilum; in *umbelliferous plants*, the line of junction of the two halves of which their fruit is composed; in *anat.*, the raised seam-like line which runs along the perinæum to the anus.

RAPHIDES, n. plu. *răf'i-dēz* [Gr. *rhaphis* or *rhaphĭda*, a needle—from *rhaptein*, to stitch together]: crystals found in the interior of the cells of plants. The word originally denoted crystals of an acicular form, often collected in bundles. But crystals of various forms are found in the cells of plants, consisting chiefly of phosphate or of oxalate of lime. In many kinds of plants they abound, and often in a particular manner in particular parts of plants. They are very minute, and are found in such delicate tissues as the petals of the Pelargonium. RAPHIDIAN, a. *ră-fid'i-ăn*, pert. to the raphides.

RAPHILITE, n. *răf'i-līt* [Gr. *rhaphis*, a needle; *lithos*, a stone]: a variety of *asbestiform tremolite*, found in groups of delicate acicular crystals, of a white or bluish-green color.

RAPID, a. *răp'id* [F. *rapide*, rapid—from L. *rapĭdus*, tearing or hurrying along, swift—from *rapĕrĕ*, to snatch: It. *rapido*, rapid: Dan. *rap*; Sw. *rapp*, swift]: characterized by quickness of motion or of utterance; quick; swift; expeditious. RAPIDS, n. plu. *răp'idz*, those portions of a river-course—often obstructed by rocks—where, in consequence of a sudden incline, the current moves with much greater swiftness than the ordinary flow of the stream. RAP'IDLY, ad. *-li*. RAP'IDNESS, n. *-nĕs*, or RAPIDITY, n. *ră-pid'i-ti* [F. *rapidité*—from L. *rapiditātem*]: quickness of motion or of utterance; speed; haste; velocity.—SYN. of 'rapid': expeditious; swift; fleet; quick; fast; speedy;—of 'rapidity': quickness; celerity; speed; expedition; swiftness; velocity; fleetness; haste; agility.

RAP'IDAN: see RAPPAHANNOCK: WILDERNESS, BATTLES OF THE.

RAPID CITY: city, cap. of Pennington co., S. D.: on Rapid river and on the Fremont Elkhorn and Missouri Valley railroad; at the summit of the Black Hills. It was originally a gold and silver mining town; but the discovery 1883 that it was the centre of the largest and richest tin region in the United States gave it a great impetus. The terr. legislature established a school of mines there 1885, and a company with a cap. of $15,000,000 was organized 1889 to operate the mines in the Harney Peak region. R. C. had (1891) 2 national banks (cap. $175,000), 2 state banks (cap. $100,000), churches, public schools, and 2 daily and 3 weekly newspapers. Pop. (1880) 292; (1890) 2,500.

RAPIER, n. *rā'pi-ėr* [F. *rapière*, a rapier—probably from Sp. *raspadera*, a raker—from *raspar*, to rasp: Ger. *rappier*: mid. L. *rapperia*]: in ancient fencing, a long cutting broadsword; but for at least a century, the R. has been a light, highly-tempered, edgeless, thrusting weapon, finely pointed, about 3 ft. in length. It was long the favorite weapon in duelling, and was worn by every gentleman. At present, it is worn only on occasions of court ceremonial, and answers no other purpose than to incommode the wearer. In war, a R. could never have been of any service. RAPIER-FISH, the sword-fish.

Rapier.

RAPIL, n. *răp'il*, or RAPILLO, n. *răp-il'lō* [It. *rapillo*]: pulverized volcanic substances.

RAPIN DE THOYRAS, *rā-păng' dā twâ-râ'*, PAUL DE: French historian of England: 1661, Mar. 25—1725, May 16; b. Castres, Languedoc; descended from a Prot. Savoyard family, which settled in France in the 16th c. He studied at the Prot. college of Saumur, and passed as advocate 1679, but had no liking for the profession; and when the Edict of Nantes (1685) forced him to leave France, he sought employment first unsuccessfully in England, and afterward enlisted in a corps of volunteers at Utrecht. With his company, he followed the Prince of Orange to England, 1688, and distinguished himself by bravery in various battles. In 1693 he was appointed tutor to the Earl of Portland's son, with whom he travelled, after which he took up his residence at the Hague. In 1707 he withdrew with his family to Wesel, in the duchy of Cleves, where he gave the remaining 17 years of his life to his great history. R.'s *Histoire d'Angleterre* was published at the Hague, 8 vols., the year before his death. It was undoubtedly, as Voltaire said, the best work on English history that had then appeared: full, minute, careful in citing authorities, clear, rapid, and accurate in narration, methodical in arrangement of materials, comparatively impartial in spirit, yet revealing the author's reverence for law and liberty. R. begins with the invasion of Britain by the Romans, and ends with the death of Charles I. The work was continued to the death of William III. by

David Durand (Hague 2 vols. 1734). The best ed. of the *Histoire* in its augmented form is by Lefebvre de Saint-Marc (Hague 16 vols. 1749 *et seq.*). The original was translated into English by the Rev. Nicholas Tindal, M.A. (Lond. 15 vols. 1725–31); subsequently by John Kelley, barrister (2 vols. fol.).

RAPINE, n. *răp'in* [F. *rapine*—from L. *rapīnă*, robbery, pillage—from *rapĕrĕ*, to seize: It. *rapina*]: the act of plundering; pillage; robbery with violence.—SYN.: spoliation; pillage; plunder; robbery; violence; force; spoil.

RAPING, a. *răp'ing:* in *her.*, a term applied to any ravenous animal borne devouring its prey.

RAPP, *răp*, GEORGE: communist: 1757, Oct. 28—1847, Aug, 7; b. Würtemberg, Germany. After attending school in his native town, he became a farmer, was married 1783, adopted communistic doctrines, and though no formal organization was effected he became the leader of quite a body of people. His course displeased the clergy and the civil authorities, and, to escape annoyance and persecution, emigration was decided upon. R., his son John, and two other followers came to the United States 1803, and purchased about 5,000 acres of land in Butler co., Penn. The following year about 600 men, women, and children came from Germany, and 1805, Feb. 15, formed a communistic organization which they called the Harmony Society. They gave the name Harmony to their settlement. R. was the leader and manager. Members who had money turned it into a common fund, and all worked for the common good. Houses were built, manufactures established, and the land was brought under cultivation. In a few years the people produced nearly everything that they needed to use, and sold large quantities of manufactured articles and farm products. In 1807 the Harmonists became a celibate order. In 1815 they removed to Indiana, and founded the town of Harmony; but the location proved unhealthful, and 1824 they removed to Beaver co., Penn., and founded a town, 17 m. from Pittsburgh, which they called Harmony, but which is known also as Economy. The people are often called Economites. Except the Mormons, they are the richest community in the world. Though their numbers have decreased from about 1,000 in 1815 to about 50 in 1891, their property has wonderfully increased and is valued at from $10,000,000 to $25,000,000. The members still cling to the customs, and even the style of dress, brought from Germany by the founders 1805. With the aid of about 350 outsiders they cultivate about 3,500 acres of land and carry on large manufactures. The Harmonists believe in the second coming of Christ, and on his appearance they expect to remove to the Holy Land.

RAPP, *răp*, JEAN, Count: French general: 1772, Apr. 1821, Nov. 8; b. Colmar, dept. of Haut-Rhin. He was intended for the priesthood, but his taste for military life led him to enrol himself (1788) in the mounted 'chassours' of the French army. R. distinguished himself by dashing gallantry in Germany and Egypt, and on the death of Desaix, at Marengo, he became aide-de-camp to Napoleon. His brilliant charge at Austerlitz upon the Russian imperial guard, which put them to a complete rout, was rewarded with the grade of gen. of division (1805, Dec. 24). R. joined to bravery and coolness a quick, unerring judgment, which enabled him not only to comprehend Napoleon's plans, and execute the duties intrusted to him, but also at times to amend and even disobey his orders with the best results. The latter was the case at Lobau, where R.'s disobedience decided the battle in favor of Napoleon; and for this service, he was named a count of the empire (1809, Aug. 1). He opposed the Russian expedition with earnestness, but, notwithstanding, accompanied the emperor through the whole of it. His obstinate defense of Danzig for nearly a year, against a powerful Russian army, placed him in a high position among military men; and his chivalrous and considerate treatment of the unfortunate inhabitants during the siege was so warmly appreciated by them, that they presented him with a magnificent sword enriched with diamonds. The Russians, contrary to the articles of capitulation, sent R. and his garrison prisoners to Russia, and he did not return to France till 1814, July. On reaching Paris, he was well received by Louis XVIII.; and was one of those appointed, 1815, Mar., to oppose the return of Napoleon; but deserted, with his troops, to his old master, and was appointed commander-in-chief of the army of the Rhine (Apr. 16), and peer of France (June 2). After Waterloo, R. again submitted to Louis, but retired to Switzerland for two years, returning 1817, and receiving full pardon in the following year. He was re-created a peer of France (1819), and held various offices about the court; but broken in health by constant hard service and numerous severe wounds, he died at Paris. A vol. of Memoirs (1823, 8vo) has been published under his name.

RAPPAHANNOCK, *răp-a-hăn'ok*, RIVER: stream in Va., formed by union of the North Fork and the Rapidan, which rise in the Blue Ridge of the Alleghany Mountains, and flow e. to their union, 40 m. above Fredericksburg, where the falls afford water-power. The river is navigable from this point s.e. to Chesapeake Bay, which it enters by a broad estuary, 70 m. long. The R. and the Rapidan were the scenes of some of the most sanguinary battles of the War of Secession, at Fredericksburg, Chancellorsville, and the Wilderness (see the battles under these titles).

RAPPAREE, n. *răp′pă-rē*, or RAP′AREE [Ir. *rapaire*; AS. *reafere*; Scot. *riefer*, a robber]: wild Irish plunderer. The word is mentioned by Burnet, 1690, as a new name.

RAPPEE, n. *răp-pē′* [F. *râpe*, a grater; *râpé*, grated —from *râper*, to grate]: coarse-grained pungent species of SNUFF (q.v.). The first users of tobacco in the form of snuff used to grate away from the end of a tightly twisted bundle of prepared and dried tobacco leaves as much snuff as they needed at the moment: the bundle of leaves was in French called carrot (*carotte*); the instrument for grating, a rasp (*râpe*); the grated tobacco leaf was 'rasped tobacco' (*tabac râpé* or simply *râpé*). Hence rappee, at first a general name for snuff.

RAPPEL, n. *răp-pĕl′* [F. *rappel*, the act of recalling; *rappeler*, to recall—from L. *re*, back; *appello*, I call]: the beat of the drum to call soldiers to arms.

RAPPEN, *răp′ĕn*: small Swiss coin, made of an alloy of copper and tin, forming the $\frac{1}{100}$ part of the modern Franc (q.v.), therefore equivalent to the French centime (very nearly $\frac{1}{5}$ of a cent). The old Swiss franc (= about $26\frac{1}{3}$ cents) was also divided into 100 R. The R. was coined first at Freiburg, and took its name from the head of a raven (Ger. *rabe*, pronounced in some parts *rape*) impressed upon it.

RAPPITE, n. *răp′īt*: follower of George RAPP (q.v.).

RAPPORT, n. *răp-pōrt′* [F. *rapport*, relation]: relation; harmony; agreement; contact; reference. EN RAPPORT, *âng râp-pōr′* [F. phrase]: in relation; in connection.

RAPPROCHEMENT, n. *râ-prōsh′măng* [F.]: agreement; understanding; reconciliation.

RAPSCALLION, n. *răp-skăl′yŭn* [a form of RASCALLION (see also RAMPALLIAN)]: a low tattered creature; an insolent servant.

RAPT: see under RAP 2.

RAPTORES, n. plu. *răp′tō-rēz* [L. *raptor*, a snatcher, a robber; *raptōrēs*, robbers—from *rapiō*, I snatch]: the birds of prey; the systematic name of an order of birds characterized by the strength of their claws and bills (see ACCIPITRES). RAP′TOR, n. *-tŏr*, one of the order of the birds of prey. RAPTORIAL, a. *răp-tō′rĭ-ăl*, or RAPTO′RIOUS, a. *-ŭs*, pert. to birds of prey.

RAPTURE, n. *răp′tūr* or *-chûr* [L. *raptūrā*, about to seize and carry off—from *rapĕrĕ*, to seize: It. and Sp. *raptura*, ravishment]: violence of any pleasing passion; transport; extreme joy or pleasure; great enthusiasm; in *OE.*, rapidity; haste. RAP′TURED, a. *-tūrd*, transported; ravished. RAP′TUROUS, a. *-tū-rŭs*, expressing the highest degree of pleasure; ravishing; transporting. RAP′TUROUSLY, ad. *-lĭ*, with the highest degree of pleasurable excitement.—SYN. of 'rapture': ecstasy; transport; delight; bliss; enthusiasm.

RARA AVIS, phrase, *rā'ra ā'vis* [L., a rare bird]: rare bird; hence, a prodigy, a person or thing of very uncommon occurrence.

RARATON'GA: see COOK ISLANDS.

RARE, a. *rār* [F. *rare*—from L. *rārus*, not thick or dense: It. *raro*]: occurring but seldom; scarce; unusual; unusually excellent; incomparable; thin; not dense; thinly scattered. RARE'LY, ad. *-li*, not often; seldom; finely; excellently; in *OE.*, nicely; accurately. RARE'NESS, n. *-nĕs*, or RARITY, n. *rā'ri-ti* [F. *rareté*]: state of being uncommon; value arising from scarcity; something valued for its scarcity; thinness—opposed to *density*. RARE BIT, a dainty morsel.—SYN. of 'rare': scarce; unusual; uncommon; incomparable; extraordinary; infrequent; singular; thin; subtile.

RAREE-SHOW, n. *rā'rē-shō* [contracted from *rarity*-show]: a show carried in a box.

RAREFY, v. *rā'rē-fī* [F. *raréfier*, to rarefy—from L. *rārēfăcĕrĕ*, to rarefy—from *rārus*, thin; *faciō*, I make: It. *rarefare*]: to make or become thinner and lighter; to become porous; to cause to expand or increase in bulk without adding any new portion, as air by heat. RA'REFYING, imp. RA'REFIED, pp. *-fīd*: ADJ. made thin or less dense. RA'REFI'ABLE, a. *-fī'ă-bl*, able to be made thinner or less dense. RA'REFAC'TION, n. *-făk'shŭn*, the act of making rare or less dense; the state of being rarefied.

RAS, *răs* or *râs* (= Heb. *rosh*): Arabic word, signifying 'head,' 'promontory,' occurring in the names of many capes on the Arabian and n. African coasts, also in Sicily and Malta; e.g., Ra-sigelbi (corrupted from Rasi-calbo), 'the dog's cape,' on the n. coast of Sicily; Ras-el-Abyad, 'white cape,' on the coast of Palestine; Ras Bab-el-Mandeb, 'cape of the gate of tears,' at the Strait of Bab-el-Mandeb; Ras-el-Jezirah, 'cape of the peninsula;' Ras-el-Had, e. point of Arabia.

RASANT, a. *râ-zŏng'*, or RASANTE, a. *râ-zŏngt'* [F. pp. of *raser*, to shave]: a term applied to a style of fortification in which the command of the works over the country is kept very low, so that the shot may sweep the ground with more effect.

RASCAL, n. *răs'kăl* [Norw. *raska;* Sp. *rascar;* It. *rascare*, to scrape: F. *racaille*, the base and rascal sort, the scum; *racler*, to scrape: Dut. *racalie*, the dregs of the people]: *literally*, the scrapings and refuse of anything; a tricking dishonest fellow; a rogue; a knave; a scoundrel; a villain; in *OE.*, a lean deer: ADJ. in *OE.*, mean; lean; low. RAS'CALLY, a. *-li*, meanly trickish or dishonest; vile; knavish; worthless; base. RASCAL'ITY, n. *-ĭ-ti*, mean trickery or dishonesty; base fraud. RASCALLION, n. *răs-kăl'yŭn*, a low mean fellow; a rascal—connected with *rapscallion*, which see.

RASE, v. *rāz* [L. *rāsus*, scraped, erased—from *rādĕrĕ*, to scrape: It. *raschiare;* F. *raser*, to rase (see also RAZE)]: to scratch or rub out; to obliterate; to level with the ground. RA'SING, imp. RASED, pp. *rāzd.* RASURE, n. *rā'zūr*, a rubbing or scraping out.—SYN. of 'rase': to skim; graze; overthrow; destroy; root up; blot out; erase; raze; efface; expunge; cancel; level; prostrate; subvert; ruin; demolish.

RASH, a. *răsh* [Ger. *rasch*, quick, impetuous: Dan. *rask*, quick: Icel. *röskr*, vigorous; *ruska*, to make a creaking noise: AS. *rascian*, to move rapidly to and fro]: acting hastily and incautiously; uttered in haste and with too little reflection; indiscreet; headstrong; in *OE.*, quick; sudden: N. a rushing or sudden breaking out of an eruption on the skin, characterized by a red superficial efflorescence, diffused or in patches, disappearing under pressure, and usually ending in desquamation. To this division of cutaneous disorders belong Rubeola (or Measles), Scarlatina (or Scarlet Fever), Erysipelas (or St. Anthony's Fire), Erythema, Roseola (or Scarlet Rash), and Urticaria (or Nettle Rash). Of these rashes, Rubeola, Scarlatina, and Erysipelas are to be regarded rather as fevers or blood diseases than as cutaneous diseases in the true sense of the phrase. RASH'LY, ad. *-lĭ.* RASH'NESS, n. *-nĕs*, the quality of being rash; inconsiderate promptness.—SYN. of 'rash, a.': headlong; foolhardy; heedless; incautious; unwary; precipitate; headstrong; hasty; indiscreet; inconsiderate; thoughtless; careless;—of 'rashness': temerity; hastiness; precipitancy; indiscretion; foolhardiness; carelessness.

RASH, n. *răsh* [Bav. *rösch*, crackling, crisp: It. *raschiare*, to scrape or grate: L. *rasūrus*, about to cut close—from *rādĕrĕ*, to shave: imitative of the sounds rustling, broiling, or frizzling]: corn in the straw so dry as to easily fall out in the handling: V. in *OE.*, to cut into pieces; to split asunder; to divide; to snatch. RASH'ING, imp. RASHED, pp. *răsht.* RASH'ER, n. *-ĕr*, a slice of broiled bacon; a thin slice of bacon for frying.

RASHER: see under RASH 2.

RASHI, *răsh'ē* (i.e., Rabbi Solomon [Shelomo] Izaaki, or Solomon, son of Izaak, often erroneously called Jarchi): the greatest Jewish commentator and exegete of the middle ages: about 1040—about 1105; b. Troyes, France. By some Christian writers he is called Isacides. The range of his studies was extraordinarily wide, his early developed faculties were brilliant, and his industry and perseverance enormous. Philology, philosophy, medicine, astronomy, civil and canonical law, exegesis, were the chief branches of his learning; and to a rare proficiency in them, he united complete mastery of the whole range of Scripture and the Talmudical sources. To perfect himself for his gigantic task, he travelled seven years, visiting the academies of Italy, Greece, Germany, Palestine, Egypt, where he sat at the

feet of the great masters of the age, collecting their sayings and legal decisions. His chief work—and one universally recognized as the principal work of all Scriptural exegesis—is his Commentary on the whole of the Old Testament. Till this day, it has not been superseded in its own field by any other, though in philology and antiquities, investigation has been greatly furthered since his time. R.'s style is extremely brief and concise, yet clear and pregnant; obscure and abstruse (as it has been pronounced by some) only to those who lack the necessary preliminary knowledge. According to the fashion of its day, it is replete with allegorical or rather poetical illustrations, gathered from the wide fields of the Midrash within and without the Talmud; and many a passage is thus preserved to us, which, in the disordered state of those manuscripts, would probably otherwise have been lost. This Commentary—entirely translated into Latin by Breithaupt, partly also into German—was the first book ever printed in Hebrew (Reggio 1474), and has since been reprinted with almost every complete edition of the Hebrew Bible. Of his numerous other works is to be mentioned first his Commentary on 23 treatises of the Talmud, supplemented after his death by his grand-son, Samuel ben Meïr; further, a Commentary on the Pirke Aboth; the *Perdes*, treating of Laws and Ceremonies; a Collection of Legal Votes and Decisions; a Commentary on Midrash Rabbah; a Book of Medicine; a Poem on the Unity of God, etc. Such was his piety and his surpassing eminence, that later generations wove a shining garland of legends around his head. The confusion of R. with two Jarchis, who lived long after him, has not hitherto been properly accounted for. They bore that surname because they were born at Lunel, Jerach being the Hebrew for moon, *Lune* in French.

RASHT, *rásht*, or RESHD, *rēsht*: city, cap. of the Persian maritime prov. Gilan; n. lat. 37° 18′, e. long. 49° 37′; 150 m. n.w. of Teheran; on the bay of Enzeli, a lagoon about 16 m. from the port of Enzeli, on the s. shore of the Caspian Sea, with which it is connected by a water route of lagoon and river (Sesidrud), navigable only by flat-bottomed boats (12 m.) and by a road of 4 m. R. has paved streets, well-built houses, water-works, a vast ruinous palace, several great caravansaries, and bazars with 1,200 shops, to which come traders from remote regions, even from India. It is a centre of the Persian silk-trade, and of the silk textile industry: its manufacture of embroidery has high repute. Its exports are silk, rice, caviare, jewelry, boxwood, walnut timber, etc.; imports are sugar, glass and earthen ware, cotton, woolen goods, etc. The Brit. and Russian govts. are represented at R. by consuls. Pop. estimated (1885) 42,000.

RASING, n. *rāzĭng*: the act of marking by the edges of molds any figure upon timber, etc., with a rasing knife, or with the points of compasses.

RASK, *râsk*, RASMUS CHRISTIAN: Danish philologist: 1787, Nov. 22—1832, Nov. 14; b. Brendekilde, near Odense, in the island of Fünen. He studied at Copenhagen, and 1808 published his first work, on the Icelandic language. 1807-12 he occupied himself with drawing up grammatical systems for most of the Germanic, Slavic, and Romanic tongues, and in comparing them with those of India. He then visited Sweden, where he began to study Finnish; and 1813 proceeded to Iceland, where he lived two or three years, perfecting his knowledge of the language and history of the inhabitants. On his return to Copenhagen, he published 1818 a splendid work, *Undersaegelse om det gamle nordiske eller Islandske Sprogs Oprindelse* (Researches Concerning the Origin of the Icelandic or Ancient Language of the North), which led Grimm to his famous discovery of the displacement of consonants in the Teutonic languages. Previous to this, however, he had resolved to visit Asia. After a year (1817) in Stockholm, where he published his admirable Anglo-Saxon Grammar and the first critical and complete edition of the two great monuments of Scandinavian mythology, the *Snorra Edda* and the *Edda Saemundar*, he went to St. Petersburg, where for two years, with intense eagerness, he studied the oriental languages, acquiring also a knowledge of Russian and Finnish. Thus equipped, he proceeded to Astrakhan, where he stayed six weeks, to study the language of the Tartars; and then journeyed through the country of the Turkomans, the Caucasus, Persia (where he added the Mongol and Manchu dialects to his already enormous linguistic acquisitions), Hindustan (cultivating in the last-mentioned country the society of learned Brahmans, and visiting all their great schools), and finally Ceylon, where he made himself acquainted with Cingalese and Pali, and wrote his *Singalesisk Skriftlaere* (Colombo 1822). In 1823 R. returned to Copenhagen, laden with learning and with rare MS. treasures, of which the greatest part was presented to the university. In 1825 he was appointed prof. of 'literary history,' and 1828 of oriental languages. Next year, he was made chief custodier of the univ. library; and 1831, prof. of Icelandic. But his immense labors had exhausted his energies, and he died at the early age of 45, a victim of hard work. Besides the productions already mentioned, R. wrote works on anc. chronology; also grammars of several languages, and a great number of miscellaneous articles in the learned journals of the North, which were collected and published (Cop. 3 vols. 1834-38) with a life by Petersen.

RASKOLNIKS (Separatists), n. plu. *răs-kŏl'nĭks* [Russ. *raskolo*, a division]: in *Russia*, the name of a variety of sects, dissenters from the Russian Church, which date from an early period. Such dissent is traceable from the very earliest period of the distinct organization of the Russian Church. A monk, named Andrew, 1003; another, Demitry (Demetrius), 12th c.; an Armenian

monk, Martin, who was burned as a heretic at Constantinople in the end of the 12th c.; Leo, Bp. of Rostow, in the beginning of the 14th, and Strigoinik and Nikita toward its close—are mentioned as having originated or propagated various heresies. A still more remarkable and more formidable organization—a form of Crypto-Judaism—was introduced in the 15th c. by a concealed Jew, called Zacharias, who gained many followers. One of these, Zosima, is particularly noticeable, as having obtained much popularity, and even managed to be elected metropolitan of Moscow. His sect, which studiously concealed itself wherever this concealment seemed necessary, was condemned by a synod (1490), and repressed with great rigor; but it maintained a concealed and precarious footing, and is said to possess disciples even to this day, especially in the govt. of Irkutsk, under the name Sebs-newschtschina. A sect, whose leading principles were borrowed from the German reformers, was founded 1553 by Matthias Baschkin; but it was condemned at a synod in Moscow, and does not appear to have taken much hold on the people.

But it is from the middle of the 17th c. that—the separation of the sects from the national church having become more tangible, from its involving non-conformity with the established worship—the designation R. finds its fullest application. At that period, a complete revision of the ancient Slavonic liturgical and ritual books, which had suffered grievously from the ignorance, probably also from the heterodoxy, of transcribers, was undertaken by the patriarch Nikon. See PHILIPPINS. The revised books were introduced into the churches by authority of the czar as well as of the patriarch; but many of the clergy and people resisted the innovation, and refused the new liturgies. Foremost among the recusants, or non-conformists, were those who had already been sectaries on other grounds; but all differences were to some extent merged in this common ground of protest, and all were known under the common appellative Raskolniks.

In later Russian history, the R. are sometimes called by the name, which they themselves affect, of Starowierzi ('Men of the Old Faith'), or Prawaslawnüje ('orthodox'). Each sect has its specific doctrinal peculiarities; but most of them follow certain common observances, in which lies their tangible difference from the national church. They cross themselves with the first and middle finger, and not with the first three fingers; they use only the unrevised service-books; they repeat Halleluiah only twice, in church ceremonies, they turn from left to right, and not from right to left; they use seven and not five altar-breads in the eucharistic offering; they pay worship only to ancient pictures, or those painted by themselves; they use an eight-pointed instead of the ordinary cross; they attend only their own churches, and hold no communion of worship with the members of the national church; they never

shave or cut their hair, and adhere strictly to the old Russian costume.

They may be divided, in general, into two classes—those which have popes (priests), and those who do not recognize the priestly order. The former are in every respect more moderate and more free from fanaticism than the R. who discard the ministry of priests. Their priests, however, have often been outcasts of the orthodox church, who betook themselves to the rival communion. The most notable among the R. of this class (having priests) are the Peremasanowschtina, who re-ordain all popes joining their communion; the Jewlewschtschina, who are said to permit freedom of divorce and exchange of wives; Dositheowschtschina, so called from their founder, a monk named Dositheus; and Tschernobolzi, whose chief distinction consists in refusing to take an oath and to say the prayer for the emperor prescribed in the liturgy. Of the popeless Raskolniks, the chief are the Philippins (q.v.), the Pomoræ-nians or Rebaptizers, the Theodosians—an offshoot of the Pomoræ-nians—and a sect of mystic spiritualists with strong Prot. and rationalistic leanings, called Duchoborzen. A curious development of the Raskolnik movement is found in the Samokrischtschina (Self-baptizers) and the Samostrigolschtschina (Self-ordainers), among whom each one administers baptism to himself, each priest ordains himself, and each monk or nun performs the ceremony of his or her own consecration without interposition of the regular ministry. With a considerable proportion of these various sectaries, there is largely mixed with religious fanaticism an element of communism and of disaffection toward the reigning dynasty, or, more properly, toward the established order of things. The latter may be in part explained by the rigorous measures of repression under which the R. have suffered for many generations. The former is an ordinary accompaniment of the sectarianism of the poor and is especially frequent among sectaries of the peasant class.

RASLE, *râl*, SÉBASTIEN (improperly spelled Rasles, Raale, Râle, etc.): Jesuit missionary priest; 1658–1724, Aug. 12; b. Dôle, France. He entered the Company of Jesus after completing his studies in the College of Dijon, and was, when ordained priest, assigned to the mission in Canada, 1689. He took charge of the mission station of Norridgewock, on the Kennebec river, 1695, and began his labors among the Abenakis, whose language he quickly mastered, and whose confidence and affection he won by sharing all their hardships and perils. The mission became a sort of outpost of New France against New England. Rasle has been accused of inciting the Abenakis to attack the English settlements along the coast, but he seems only to have endeavored to prevent his proselytes from having dealings with the English. But the New England men held R.

to be the chief instigator of the forays; so an armed party attacked Norridgewock 1705, and burned the church; the church was rebuilt, but another expedition destroyed it and pulaged the missioner's cabin, carrying away among the spoil his Abenaki dictionary. Again 208 men from Fort Richmond surprised Norridgewock and slew many of the inhabitants: R. was shot as he stood at the foot of the mission cross, 1724, Aug. 12.

RASORES, n. plu. *rā-zō'rēz* [L. *rāsus*, scraped or scratched—from *rādĕre*, to scrape]: the systematic name of an order of birds, so called from their habit of scrap-

Rasores.
1. head and foot of jungle-fowl; 2, of common pheasant; 3, of wild turkey; 4, of common grouse.

ing or scratching up the soil in search of food, as the common barn-fowl, turkey, etc. RASO'RIAL, a. *-rĭ-ăl*, pert. to the rasores or scraping birds.

RASP, n. *râsp* [OF. *rasper*; F. *râper*; Sp. *raspar*, to scrape: Ger. *raspeln*, to rasp: It. *rascare*, to scrape, to hawk or spit up phlegm with a harsh noise: Bav. *raspen*, to scrape upon a fiddle]: a kind of rough file; a fruit, so called from its roughness (see RASPBERRY): V. to rub or grate with a rough file or rasp. RASP'ING, imp. RASPED, pp. *râspt*. RASP'ER, n. *-ĕr*, a scraper. RASP'INGS, n. plu. *-ingz*, particles scraped off. RASP'ATORY, n. *-ă-tĕr-ĭ*, an instr. used by surgeons in scraping diseased bones,

RASPBERRY, n. *răz'bĕr-ĭ* [Eng. *rasp*, from the rough appearance of the fruit, and *berry*], (*Rubus Idæus*): most valued of all the species of Rubus (q.v.). It has pinnate leaves, with 5 or 3 leaflets, which are white and very

Raspberry (*Rubus Idæus*).

downy beneath; stems nearly erect, downy, and covered with very numerous small weak prickles; drooping flowers, and erect whitish petals as long as the calyx. The wild R. (*R. Idæus*), from which come certain of the garden varieties, has scarlet fruit, and is found in thickets and woods throughout Europe and n. Asia. The R. has long been in cultivation for its fruit. There are many cultivated varieties, with red, yellow, and white fruit, much exceeding the wild kind in size. The stem in a wild state is 3–4 ft. high; in cultivation, 6–8 ft. or upward. Some cultivated varieties are also more branching than is common in a wild state, the stem of the wild plant being simple or nearly so. The root is creeping, perennial; the stems only biennial, bearing fruit in the second year, woody, but with very large pith. Native N. Amer. species are the Dwarf R. (*R. triflorus*) of the north, almost herbaceous and of no value; the Black R. or Thimbleberry (*R. occidentalis*), with hooked prickles, and purple-black fruit, sometimes amber-color; and the Wild Red R. (*R. strigosus*). A species with gigantic fruit occurs west of the Rocky Mts. There are also a few cultivated varieties which are crosses between the red and blackcap sorts. The red R. is propagated by suckers which grow from underground runners, or by root cuttings started under glass. The ground should be rich and deeply plowed and the plants set, five ft. by six ft. apart, in Oct. or Nov. or else in spring. Fair crops should be obtained in two or three years, and the plants keep in bearing 8 to 12 years. Except while the fruit is forming, the soil between the rows should be

kept loose by cultivation, but in dry localities mulching is desirable to keep the ground moist and prevent growth of weeds. The mulch should extend nearly two ft. each side of the row. From three to five canes may be allowed to grow in each hill. To make them strong, cause the formation of laterals, and promote fruitfulness, the stalks should be pinched, or cut, back to a height of three ft., and the laterals pinched back to 12 inches in length. Except in exposed locations, plants properly pinched back will be strong enough to stand without stakes. Fruit is produced on wood of the previous year's growth. Consequently all old canes should be cut out in the fall or early in the spring. Unless wanted to form new plants, suckers should be promptly removed. A liberal quantity of manure thoroughly decomposed should be worked lightly into the soil early in the spring. The blackcap R. produces black fruit and is more prolific than the red R. It is propagated by layers in Aug. or Sep. The ends of the canes are bent down and slightly buried, the ground having been previously mellowed, and they soon form good plants. The care required is the same as for the red R. New varieties of either species are grown from seed. The fruit is used for dessert; for jams, jellies, etc.; for making or flavoring many kinds of sweetmeats; and mixed with brandy, wine, or vinegar, for the preparation of *R. Syrup*, *R. Vinegar*, etc. Different preparations of it are used in medicine in cases of fever, inflammation, etc. Raspberries, fermented either alone or with currants and cherries, yield a strong and very agreeable wine, from which a very powerful spirit can be made.—Some of the other species of *Rubus*, most nearly resembling the R., produce also agreeable fruits. *R. odoratus* is a highly ornamental shrub, native of Canada and the northern states, is frequent in gardens in Europe and America. The flowers are purplish rose-color, 1–2 in. diam., and the fruit broad and flattish. Another species of 'Flowering R.' is the White (*R. Nutkanus*), with narrower petals; it is found from upper Mich. to the Pacific.

RASP'BERRY VIN'EGAR: culinary preparation of raspberry juice, vinegar, and sugar. It is best made by putting carefully gathered and very ripe raspberries into jars, which, when as full as they will hold of the fruit, are filled with good vinegar: after eight or ten days, the vinegar is poured off, and the fruit is allowed to drain for some hours. The mixture of vinegar and juice thus obtained is added to another quantity of fruit, and treated in the same way. This is sometimes repeated a third time, and then the liquid is gently boiled about five minutes with its own weight of refined sugar. Added to water, it forms a refreshing summer beverage, and is a useful cooling drink in sickness.

RASTATT, or RASTADT, *răs'tât:* town and fortress in Baden, on the river Murg, 3 m. from its junction with the Rhine, 15 m. s.w. of Karlsruhe. (The official spelling is now *Rastatt.*) It is a station on the Baden railway. Steel wares, weapons, and tobacco are manufactured. 1725–71, the town was the residence of the Markgrafs of Baden-Baden. 1840–66 the fortress of R. was occupied by the troops of the Germanic Confederation. R. is memorable for two congresses—the former in 1714, when a treaty of peace, which closed the war of the Spanish Succession, was signed between Marshal Villars and Prince Eugene; the latter in 1799. On the breaking up of the congress of 1799 without any definite result, the three French plenipotentiaries set out for Strasbourg on the evening of Apr. 19; but they had scarcely passed beyond the gates of R., when they were attacked by a number of Austrian hussars; two of the three were slain, and the third sabred, and left for dead in a ditch. The papers of the legation were carried off, but no further spoil was taken. This flagrant violation of the law of nations roused the indignation and horror of all Europe. The instigator and conductor of the assault were never known. Pop.(1880) 12,356; (1890) 11,557.

RASTOLITE, n. *răst'o-līt* [Gr. *rhastos*, quickest; *lutos*, soluble]: mica-like mineral associated with pyrites.

RASURE: see under RASE.

RAT, *răt* [Ger. *ratte;* It. *ratto;* Sp. *rato;* F. *rat;* Gael. *radan;* AS. *rat*, a rat]: rodent animal of the mouse kind, but much larger and more voracious (see below): one who deserts his party—as rats are said to quit a ship in danger of sinking, also to be likely to leave at any port: one who works at less than the established prices: V. to work at a lower rate than the established prices—a term in use among printers; to forsake one's party for the sake of gain or power—from the idea that rats flee from a falling house. RAT'TING, imp. RAT'TED, pp. RAT'TER, n. *-tér*, one whose business it is to catch rats. TO SMELL A RAT, to suspect something and be on the watch. RAT'S-TAIL, a virulent disease in horses in which the hair of the tail is permanently lost. RATS-BANE [*rat*, and *bane*]: a poison for rats; arsenious acid.

RAT: popular name of all the larger species of the genus *Mus*; see MOUSE. Two species are particularly noticeable, the only species found in Europe, and both very widely distributed over the world; the BLACK RAT (*M. rattus*) and the BROWN RAT (*M. decumanus*). Extremely abundant as these animals now are, their introduction into Europe—unintentional it by human agency—took place within recent times. Neither of them was known to the ancients. Both appear to be natives of central Asia, where nearly allied species also are found. The black rat found its way to Europe about the beginning of the 16th c.; the brown rat appeared first at Astrakhan in the beginning of the 18th c., and reached w. Europe about the middle of the century. The Jacobites of Britain cherished the notion that it came with

Black Rat (*Mus rattus*); Brown Rat (*Mus decumanus*).

the House of Hanover, and chose to call it the *Hanoverian Rat*. It received the name also of *Norway Rat*, from a belief, unquestionably erroneous, that it was introduced from Norway, a country which it did not reach until long after it was established in Britain.

These two species are like one another, and very similar in their habits. The brown rat is the larger and more powerful, and has waged war against the black with such success as to cause its almost total disappearance from many places where it was formerly abundant. Rats, when pressed by hunger, do not scruple to devour the weaker even of their own kind. The extirpation of the black rat does not, however, always follow from the introduction of the brown rat, each probably finding situations more particularly suited to itself. In their native regions, they exist together; and in parts of Europe the black rat is still the more plentiful of the two. Both infest ships, and are thus conveyed to the most distant parts of the world, some of them escaping to shore at every port, and establishing new colonies.

The black rat is nearly seven inches and a half long, exclusive of the tail (almost eight inches long). The

brown rat attains a length of more than ten inches and a half, with tail a little more than eight inches long. Besides its larger size and comparative shortness of tail, it differs from the black rat in its smaller ears and less acute muzzle, as well as in its lighter color and shorter hair. The tails of both are covered with a multitude of rings of small scales.

Both species are extremely prolific, breeding at a very early age, several times in a year, and producing 10 to 14 at a birth; with result of excessive increase of their numbers, where food is abundant and enemies are few. They sometimes multiply amazingly in ships; and perhaps nowhere more than in the sewers of towns. But in the latter situation, they really render service to public health, acting as scavengers, and devouring animal and vegetable substances, whose putrefaction might otherwise produce pestilence. This seems the great use of the rat in the economy of nature; and it is noticeable that the visits of the plague to w. Europe have ceased from the time when rats became plentiful. The brown rat inhabiting sewers or the sub-structures of wharves is generally larger, fiercer, and of coarser appearance than the same species in houses or barns. Rats are often found also inhabiting burrows in dry banks, near rivers, etc. They feed indiscriminately on almost any animal or vegetable food; they make depredations in fields of grain and pulse, from which they often carry off large quantities to be stored in their holes; they devour eggs; they kill poultry, partridges, etc.; they make most unwelcome visits to dairies and store-closets; and they multiply enormously in the vicinity of slaughter-houses, which afford them great supplies. Their strong rodent teeth enable them to gnaw very hard substances, such as wood and ivory, either for food, or in order to make their way to more tempting viands.

In the United States, the Black R. (*M. rattus*), the body 7–8 in., an immigrant from the old world in the 16th c., has been driven out in many places where the Brown or Norway R. (*M. decumanus*) has invaded since its arrival about 1775; the latter, which measures 8–10 in. without the tail, is too fierce and strong for its timid predecessor. The Roof or White-bellied R. (*M. tectorum*), the body 6½ in., originally from Egypt, entered America in the 15th c., is found in the s. states, as well as in Mexico and Brazil, and prefers thatched roofs for its abode. The native so-called rats are more mouse-like in character, though rat-like in appearance; such is the Florida R. (*Neotoma Floridana*), 8 in., mixed lead color and brown, the tail white beneath; it is found in the Gulf states, inhabits wild places, and sometimes builds mounds of leaves in swamps or even nests in trees. The Cotton R. (*Sigmodon hispidus*) is so named from its use of cotton in forming its nest; it is reddish brown, lives in thickets and ditches, and feeds on seeds, small animals, and eggs of birds. There is a species in the Rocky

Mt. region that invades the trappings and stores of those who camp out, and works some destruction.

Rats are creatures of much intelligence. Many curious stories are told of the arts which they employ to attain desired objects, of their readiness in detecting danger, and their skill in avoiding it. Their sense of smell is acute, and the professional rat-catcher is very careful that the smell of his hands shall not be perceived on the trap. They are capable of being tamed, and have in some instances proved interesting pets.

The flesh of rats is eaten only by rude tribes, or when food is scarce. The skin is used for making a fine kind of glove-leather.

The name rat is often popularly given, not only to species nearly allied to these, but to other species of *Muridæ*, now ranked in different genera: for some of these, see other titles.

RAT, WATER: see VOLE.

RATABLE: see under RATE.

RATAFIA, n. *rŏt-ă-fē'ă* [Sp. *ratafia*, ratafia—from Malay, *arak*, arrack, and *tafia*, spirit distilled from molasses]: generic name of a series of cordials, prepared usually by mixing an alcoholic liquor with the juice of some fruit or some flavoring material, and sugar or syrup. The name is of French origin, and is said to have been given in consequence of the former habit of preparing a choice drink to be used at the ceremony of *ratifying* a treaty. A favorite flavoring for R. is the almond—bitter almonds, cherry, peach, apricot, plum and similar kernels; hence small almond-flavored cakes are called R. cakes; but many other flavors are used; e.g., orange flowers, gooseberries, raspberries, aniseed, angelica stalks; chocolate; black currants, coffee, etc.

RATAN, or RATTAN, n. *ră-tăn'* [Malay, *rotan*; Javan, *rottang*]. (*Calamus*): genus of palms very different in habit from most of the order; having a reed-like, slender, often jointed, and extremely long stem, sometimes even 1,000 ft. or more in length. The name R. is extended to others of the same tribe of palms, having the same general habit, though constituted by botanists into different genera; it is applied also to the long shoots or stems, and to walking-sticks made from them. The stem, which is very smooth, and hard and silicious externally, is either erect, or ascends and descends among trees; often laying hold as it ascends by means of hooked prickles, the extremities of the midribs of its leaves—which are scattered at considerable intervals along its whole length and envelop it by their sheathing stalks—and then descending in graceful festoons to climb a neighboring tree. Sometimes, however, there are no leaves scattered along the stem. Sir James E. Tennent says, in his work on Ceylon: 'I have seen a specimen 250 ft. long, and an inch in diameter, without a single irregularity, and no appearance of foliage other than the bunch of feathery leaves at the extremity.'

The leaves are always pinnate, and very beautiful. The fruit is a dry berry, covered with imbricated scales, and generally one-seeded.

The species are very numerous, all natives of the E. Indies. A few species are found in s. India; but they abound along the s. foot of the Himalaya, in Chittagong, Silhet, Assam, s.e. Asia, and many of the islands of that region. They all are very useful, are much employed in their native countries for making plaited work, ropes, etc., and are very largely exported to other parts of the world, generally under the name *Cane*, and chiefly to be used for plaited or wicker work.—Bridges of great strength are made, in parts of the East, of the stems of these palms. They are twisted into ropes for binding wild elephants, and for other purposes requiring great strength: the vessels of Java, Sumatra, and neighboring regions are very generally furnished with cables made of them, which are extensively manufactured at Malacca; and the Chinese make ropes of ratans by splitting them longitudinally, soaking them, and attaching them to a wheel, which is kept in motion, while new ratans are added, one by one, to increase the length of the rope.—The species *Calamus rudentium*, which has very long stems, is much used in rope-making. Many species probably furnish the canes of commerce, one of which, *C. verus*, native of India, is only about 20 ft. in length. The elegant walking-sticks called

Calamus, or Ratan:
a, part of a stem with leaves; *b*, inflorescence.

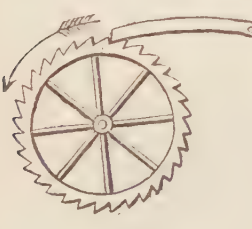
Malacca Canes are believed to be the product of *C. scipionum;* the plant, however, grows not in Malacca but in Sumatra.—Small stems of R. are used as a poor

substitute for whalebone in umbrellas.—The fruit of some species of R. is a delicate article of food; and the young shoots, variously dressed, are equal to the finest of vegetables.—A very fine kind of *Dragon's Blood* (q.v.) is obtained from a species of R. (*C. Draco*), particularly from the fruit, on the surface of which it appears as a resinous exudation. The canes of commerce are imported usually in bundles of 100, each cane 15 to 20 ft. in length.

RATANY, or RAPTANY, or RHATANY, n. *rāt'ā-nī* (*Krameria triandra*): half-shrubby plant, of natural order *Polygalaceæ*, native of the cold sterile table-lands of the Andes in Peru and Bolivia. It is called *Ratanhia* in Peru. It is valued for the medicinal properties of the root, which are shared more or less by other species of the same genus, also natives of S. America. The dried root is a powerful astringent, and a useful tonic; and is employed in mucous discharges, passive hemorrhages, and cases of relaxation and debility. It is used also as a tooth-powder, often mixed with orris-root and charcoal. R. root is exported from different parts of S. America, chiefly from Lima. It is extensively imported into Portugal for use in giving a rich red color to wines. The peculiar properties of R. root are supposed to be due chiefly to an acid called *Krameric Acid*.

Ratany.

RATCHET, n. *rach'ĕt*, or RATCH, n. *rāch*, or ROCHET, n. *roch'ĕt* [perhaps from *rack*: comp. also Eng. *rock*, a distaff: It. *rocchetto*, the cog-wheel of a mill: F. *rochet*, a ratchet]: in *clock* and *watch making*, a small metal arm or bar with one end on a pivot, and the other end abutting against a toothed wheel, called a *ratchet-wheel*—the use of the bar being to drop against tooth after tooth of the wheel, either to communicate motion or to prevent backward motion; in the former case called a *click* or *pawl*, in the latter a *detent*. In *mech.*, R. is a bar having angular teeth, into which a pawl drops to prevent a machine being reversed when in motion. RATCHET-WHEEL, wheel with sharp saw-like teeth against which a ratchet abuts; the teeth having the form of an inclined plane on one side, and a perpendicular face on the other, the wheel can revolve only in the direction away from the bar.



Ratchet.

RATE, n. *rāt* [L. *ratus*, reckoned, calculated—from *rĕor*, I judge: It. *rato*, calculated, confirmed]: a calculated proportion; allowance settled; assessment at a certain proportion; local tax; money payment levied on the owners or occupiers of real property, in respect of some benefit to such property, or in discharge of some legal liability attaching to it (see TAX): price or amount stated or fixed; degree in which anything is done or valued, as speed and price; class or rank, as of a ship; comparative height or value: V. to compute; to estimate; to value; to determine the degree or proportion of; to be placed in a certain class or rank, as a ship. RA′TING, imp. setting at a certain value; laying on a tax: in the *navy*, the grade in which a man is entered on the ship's books—e.g., as able seaman, or as petty officer. Rating of ships is a classification, merely for purposes official and administrative, for assigning the complement of officers and other arrangements: N. the act of one who rates or estimates. RA′TED, pp. set at a certain value; set in a certain order or rank. RA′TER, n. *-tĕr*, one who rates. RATABLE, a. *rā′tă-bl*, set at a certain value; liable or subjected by law to taxation. RA′TABLY, ad. *-blī*. RA′TABIL′ITY, n. *-bĭl′ĭ-tĭ*, the quality of being ratable. RATE OF CHRONOMETER, the daily change in its error. RATE OF SAILING, in *nav.*, the speed of a ship at sea, ascertained by heaving the log every hour. PRO RATA, *prō rā′tă* [L. *pro*, according to, and *rata*, the calculated part, *partĕ* being understood]: in proportion. RATEPAYER, one who is assessed, and pays a rate or tax.—SYN. of 'rate, v.': to value; compute; reckon; calculate; proportion; appraise; estimate.

RATE, v. *rāt* [Eng. *rate*, to tax, in the sense of 'to impute or lay something to one's charge': Sw. *rata*, to find fault with]: to reprove; to scold; to chide; to censure severely. RA′TING, imp.: N. the act of chiding or scolding. RA′TED, pp. chid; reproved. BERATE, to launch forth angry words against a person.

Ratel (*Mellivora Ratel*).

RATEL, n. *rā′tĕl* (*Mellivora*): genus of quadrupeds of the Bear family, *Ursidæ*, nearly allied to the Gluttons

(q.v.), from which it differs in having one false molar less in each jaw, and the upper tubercular teeth slightly developed. The general aspect is similar to that of the badgers, but heavier and more clumsy. Two species are known, one of which, the CAPE R. (*M. Ratel* or *Capensis*), inhabits s. Africa, and is said to feed much on bees and their honey, its thick fur protecting it against their stings; the other inhabits n. India, prowls about by night, is a voracious devourer of animal food, and often scratches up recently interred bodies from their graves. The Cape R. is about the size of a badger; gray above, black below. It is easily tamed, and is amusingly active in confinement, continually running about its cage, and tumbling strange somersaults to attract the attention of spectators, from which it seems to derive great pleasure.

RATEL-I-COUM, *rā-tĕl'ē-kōm' :* Turkish sweetmeat, which has become common in confectioners' shops under several names, chiefly 'Turkish Delight.' Its composition is starch and syrup, sometimes colored, and sometimes flavored. It is imported in the form of small cakes, about an inch thick, and one or two inches square, evidently cut from a mass. These pieces have been sprinkled with powdered white sugar, to prevent them from sticking together in the small boxes in which they are packed.

RATH, n. *rāth :* in *Ireland*, a hill or circular mound.

RATH, or RATHE, a. *rāth* [AS. *rathe* or *hrathe*, early, soon; *hrathian*, to be quick: Icel. *hradr*, quick: Dut. *rad*, nimble: comp. It. *ratto*, quick]: coming before others; before the usual time; soon; early; it occurs frequently in place names, as Rathmore, Rathgar; a kind of pre-historic fortification in Ireland, consisting of a circular rampart of earth with a mound artificially raised in the centre: AD. early; betimes. RATHER, ad. *rāth'ĕr*, more readily or willingly; with better liking; preferably; somewhat; more so than otherwise; in some degree; more correctly speaking; sooner. THE RATHER, the sooner; the more so. I HAD RATHER, I would sooner.

RATHENAU, or RATHENOW, *rā'tĕh-now :* town of Prussia, province of Brandenburg, on the right bank of the Havel (here crossed by a stone bridge), 45 m. w.n.w. of Berlin. It consists of two portions, one old, surrounded by walls; the other new. Weaving, spinning, and brick and tile making are carried on, and there are factories of optical instruments. Pop. (1880) 11,394.

RATHKEALE, *răth-kāl' :* market and post-town of county Limerick, Ireland; on the river Deel, 17 m. s.w. of Limerick. R. has some inland commerce. It is remarkable as a chief centre of the Palatine settlers introduced into Ireland soon after the close of the Jacobite war. Several of the families still remain in the district. Pop. (1861) 2,761; (1881) 2,549; (1891) 2,073.

RATHLIN, *răth-lĭn′*, ISLAND OF: island 6½ m. long, 1½ m. broad; in the barony of Carey, county Antrim Ireland; 6½ m. off the coast at Ballycastle; lat 54° 36′ n., long. 9° 15′ w.; supposed to be the Ricinia of Ptolemy, and Ricnia of Pliny; and called variously by later writers Rachri, Raghlin, and Ragheren, or Ragh Erin (fortress of Ireland). R. has been known in history since the days of the first religious migrations of the Irish monks under Columba: it was the scene of more than one struggle in the Danish wars, and it afforded shelter to Robert Bruce after his defeat in Scotland. In 1558, the Scottish colony which then inhabited it was attacked by the lord-deputy Sussex, and expelled with such slaughter, that in 1590 R. was said to be entirely uninhabited. The geological formation is basalt with limestone, and on the e. side the basalt takes columnar form, similar to that of the Giants' Causeway on the Irish, and of Staffa on the Scottish shore. The soil is light, but in the sheltered valleys productive. Since the cessation of the manufacture of Kelp (q.v.) in R., the pop. (1841) 1,039, had decreased (1881) more than half.

RATIBOR, *rā′tē-bōr′*: growing town of Prussia, Upper Silesia, on the left bank of the Oder, 44 m. s.s.e. of Oppeln, on the Breslau and Vienna railway. The people are employed in the grain and timber trade and in manufacture of tobacco. Pop. (1880) 18,373; (1890) 20,578.

RATIFY, v. *răt′ĭ-fī* [It. *ratificare*; F. *ratifier*, to ratify —from L. *ratus*, fixed, settled—from *rĕor*, I judge; *făcĭō*, I make]: to confirm; to approve and sanction; to settle; to establish. RAT′IFYING, imp. RAT′IFIED, pp. *-fīd*. RAT′IFIER, n. *-fī-ĕr*, one who ratifies. RAT′I-FICA′TION, n. *-fĭ-kā′shŭn*, confirmation; act of giving sanction and validity to something done by another; in *Scotch law*, acknowledgment by a married woman apart from her husband, and before a justice of the peace, that a deed executed by her is voluntary, and with full knowledge of its legal effect; also confirmation by a person arrived at majority of acts done by him during minority; the solemn act by which a treaty between nations becomes valid.

RATIO, n. *rā′shĭ-ō*, plu. RATIOS, *rā′shĭ-ōz* [L. *ratĭō*, a reckoning, a calculation—from *rĕor*, I reckon or think]: relation of two quantities of the same kind to one another; the rate in which one quantity exceeds or is less than another—thus, 3 is to 4 in the same ratio as 6 to 8 (see RATIOS, PRIME AND ULTIMATE): rate; degree; Proportion (q.v.).

RATIOCINATE, v. *răsh′ĭ-ŏs′ĭ-nāt* [L. *ratĭōcĭnātus*, computed, reasoned; *ratĭōcĭnor*, I compute—from *ratĭō*, a computation]: to offer a reason; to reason deductively. RA′TIOC′INATING, imp. RA′TIOC′INATED, pp. RA′TIOC′-INA′TION, n. *-nā′shŭn* [F.—L.]: the act or process of reasoning; the act of deducing consequences from premises. RA′TIOC′INATIVE, a. *-nā-tĭv*, argumentative. RATIOCINATORY, a. *răsh′ĭ-ŏs′ĭ-nā′tĕr-ĭ*, characterized by

deductions from propositions, facts, and comparisons; argumentative; ratiocinative.

RATION, n. *rā'shŭn* [F. *ration*, a ration—from L. *ratiōnem*, a proportion, a computation; It. *razione*]: fixed allowance of provisions dealt out. In the army and navy, allowance of provisions authorized and provided by the govt. for each officer, non-commissioned officer, soldier, or sailor.—The U. S. army ration consists of 1¼ lb. of beef or ¾ lb. of pork, 18 oz. of bread or flour; and at the rate of 10 lbs. of coffee, 15 lbs. of sugar, 2 qts. of salt, 4 qts. of vinegar, 4 oz. of pepper, 4 lbs. of soap, and 1½ lb. of candles for every 100 rations. The R. of coffee and sugar may be commuted for the extract of coffee combined with milk and sugar at the option of the sec. of war and with acquiescence of the men, and whether commuted or not is to be issued weekly when the service will permit. Tobacco is furnished to enlisted men by the commissaries of subsistence at cost price, exclusive of the cost of transportation, in such quantities as they may require, not exceeding 16 oz. per month. Enlisted men are entitled to 1 R. per day; sergts. and corporals of ordnance to 1½, and women (nurses and washwomen) 1 or ½. Commissioned officers when serving in the field may purchase rations for their own use from any commissary of subsistence on credit at cost price, and the amount due for such purchase is reported monthly to the paymaster-gen.—The U. S. navy R. consists of the following daily allowance to each person: 1 lb. of salt pork with ½ pt. of beans or peas; or 1 lb. of salt beef with ½ lb. of flour and 2 oz. of dried apples or other dried fruit; or ¾ lb. of preserved meat with ½ lb. of rice, 2 oz. of butter, and 1 oz. of desiccated mixed vegetables; or ¾ lb. of preserved meat with 2 oz. of butter and 2 oz. of desiccated potatoes; together with 14 oz. of biscuit, ½ oz. of tea, or 1 oz. of coffee or cocoa, and 2 oz. of sugar; and a weekly allowance of ½ pt. of pickles, ½ pt. of molasses, and ½ pt. of vinegar. The following substitution for the components of this R. may be made when deemed necessary by the senior officer present in command: for 1 lb. of salt beef or pork, 1¼ lb. of fresh or ¾ lb. of preserved meat; for any or all of the articles usually issued with the salted meats, vegetables equal to the same in value; for 14 oz. of biscuit, 1 lb. of soft bread or 1 lb. of flour or ½ lb. of rice; for ½ pt. of beans or peas, ½ lb. of rice; and for ½ lb. of rice, ½ pt. of beans or peas. The extract of coffee combined with milk and sugar may be substituted for the R. of coffee and sugar. The commutation price of the navy R. is 30 cts. Rations are not allowed to officers on the retired list. *See U. S. Revised Statutes*, sec. 1145–49; 1580,1.—See CANTEEN: MESS.

RATIONAL, a. *răsh′ŭn-ăl* [L. *rationālis*, belonging to reason—from *ratiō*, reason: F. *rationnel*]: endowed with reason; agreeable to reason; judicious; acting in conformity to reason; sane: N. a rational being. RA′TIONALLY, ad. *-lĭ*. RA′TIONALNESS, n. *-nĕs*, or RA′TIONAL′ITY, n. *-ăl′ĭ-tĭ*, the power of reasoning; soundness or sanity of mind; in *arith.* and *alg.*, applied to finite expressions, or to those of which an exact root can be found. RA′TIONALIZE, v. *-ăl-īz*, to convert to rationalism; to interpret like a rationalist. RA′TIONALIZING, imp.: ADJ. professing or affecting rationalism. RA′TIONALIZED, pp. *-īzd*. RA′TIONALIST, n. *-ăl-ĭst*, one whose opinions and arguments are grounded solely on human reason; one who denies the inspiration of Scripture, and the supernatural character of its recorded miracles—deeming them against his reason. RA′TIONALISM, n. *-ĭzm*, system of opinions deduced from reason, either as opposed to the claim of the inspiration of the Bible, or as underrating the authority of inspiration in interpreting the Bible (see below). RA′TIONALIS′TIC, a. *-ĭs′tĭk*, or RA′TIONALIS′TICAL, a. *-ĭs′tĭ-kăl*, pert. to or resembling rationalism. RA′TIONALIS′TICALLY, ad. *-lĭ*. RATIONAL CHRISTIANS, n. in *chh. hist.*, a sect claiming that their methods of investigation and their faith are more rational than those of Christians in general. They obtained registered places of worship in England 1876. RATIONAL HORIZON, in *geog.*, the plane passing through the earth's centre parallel to the sensible horizon at the observer's station. RATIONAL QUANTITY, in *alg.*, a quantity that can be expressed without the use of a radical sign—opposed to *irrational* quantity or surd.—SYN. of 'rational': sane; reasonable; intelligent; sound; judicious; discreet; wise; sensible.

RATIONALE, n. *răsh-ŭn-ā′lē* [L. neut. sing. of *rationalis*, rational]: statement of reasons; account or exposition. RATIONA′LE EXISTENDI, phrase, the ground of existence.

RA′TIONALISM: strictly, that method of thought which, in framing religious doctrine, not only allows the use of reason, but considers it indispensable.—The term has now, however, acquired a far wider meaning, and stands in opposition to *Supranaturalism*, or to the belief in anything which either transcends, or, in the view of some, contradicts, both nature and reason—e.g., miracles. To comprehend rightly the struggle between Rationalism and Supranaturalism, in modern Prot. theology, it must be viewed historically. The German and Swiss divines, maintaining their polemic against Roman Catholicism (after the original enthusiasm of the Reformation had cooled), took their stand on the absolute authority of the Bible as a purely divine book, containing no admixture of error of any kind, either in form or substance —the very vowel-points of the Hebrew (an innovation long posterior even to Christianity) being expressly held to be inspired. This, the oldest and most stringent kind

of Prot. orthodoxy, has been gradually discarded, partly for its unscientific character, and partly because it was observed that the Bible itself put forth no claim to such minute linguistic infallibility. The first concessions to R. were the admissions that the biblical writers differed in their style and literary merit; next (as a logical inference from the foregoing), that they were moved by the spirit of God in the exercise of a certain individual power in composing their works. But gradually other points were assailed, some of which have been surrendered, at least in portions of the church, while other points are still tenaciously held; as that, in matters of physical science, the sacred writers spoke according to the conceptions and beliefs prevalent in their age; that, on unimportant historical points, their information might possibly be (according to some, actually was) erroneous or defective, or both; that they might err in anything except religious doctrine or sentiment, or precept; finally, that even in these also they might err, and that the Bible is not the 'Word of God,' but only contains that 'Word,' which it is the province of human reason to discover, and to separate from whatever accretions of fable, myth, symbolism, or error have grown over it through the agency of man or the lapse of time. This last is properly the theological R. of modern times, and is held in Germany, France, Holland, England, and America by many divines, who, nevertheless, look upon themselves as essentially and thoroughly Christian in their creed. But since most investigators that proceed so far, take—or show a tendency to take—yet a further step, denying the presence of any element other than human in the Bible, or that there is any satisfactory evidence of its alleged supranaturalism (though the Bible certainly and fully claims this attribute for itself), the word has, in common parlance, come to be synonymous with infidelity, or at least with an infidel sympathy and tendency.—In addition the term R. is employed in a restricted sense to denote the method of substituting for the miraculous and supernatural in Scripture, something considered reasonable—e.g., the miracle of the crossing of the Red Sea is explained by the hypothesis that the Israelites crossed when an extraordinary wind, long continued, had driven the water out and left the shallow bare; while the Egyptians, hurriedly pursuing them, were taken in the returning waters. The leader of this school was *Paulus* (q.v.), whose system, after a time, gave way to the more scientific mythical theory of Strauss (q.v.), which in turn has been largely discarded in recent years.—See MIRACLES.—Some systems of strenuous orthodoxy also, in their earnestness to set forth a complete and impregnable philosophy of Christian truth, show a certain rationalism in dealing with the Scriptures—giving the impression that their strength lies more in their admirable human reasoning than in their close adherence to the things that God has revealed.

RATIOS, PRIME AND ULTIMATE: terms introduced by Newton, pertaining to a method of calculation which is an extension of the old method of Exhaustions (q.v.). There can be little doubt that Newton discovered by means of fluxions, of which he was in possession at a very early age, the greater part of that extraordinary series of theorems regarding motion, etc., which he first published in the *Principia*. He had, however, a great partiality for the synthetic form of demonstration, employed with such success by the Greek geometers; and the consequence was that, in the *Principia*, he avoided entirely the use of analysis by fluxions, and invented for synthetical applications the closely allied method of Prime and Ultimate Ratios. The fundamental idea involved in fluxions, prime and ultimate ratios, and the differential calculus is the same, that of a *Limit* (q.v.).

To give an idea of the nature of the method, as well as to show the origin of its name, we take a very simple case. Let a particle be projected in the direction AP; it will move uniformly in that line forever, unless deflected by some external force: see MOTION, LAWS OF. Suppose that gravity alone acts on it, then (see PROJECTILES) it will describe a parabolic path, AQ, to which AP is the tangent at A; and the line PQ, which joins the disturbed and undisturbed positions of the particle at any instant, is vertical. Now, the lengths of AP and AQ are not, in general, equal, but they are more and more nearly equal as both are smaller; and, by taking each small enough, we may make the *percentage* of difference between them as small as we choose. In other words, their *prime ratio*, just at A, is unity. Again, the inscribed square is less than a circle; the octagon greater than the square, but less than the circle; the regular polygon of 16 sides greater than the octagon, but less than the circle; and so on, constantly doubling the number of sides. But it can be shown that the difference of area between the polygon and the circle may be made as small a percentage of the area of the circle as we please, by making the sides of the polygon numerous enough. Hence, the *ultimate ratio* of the areas of the circle, and inscribed polygon with an indefinitely great number of equal sides, is unity.

Fig 1.

The basis of the method, which is implicitly involved in the foregoing illustrations, is Newton's *First Lemma*: 'Quantities, and the ratios of quantities, which tend constantly to equality, and may be made to approximate to each other by less than any assignable difference, become ultimately equal.' In other words, if we can make the *percentage* of difference of two quantities as small as we choose, we must produce ultimate equality.

From this, in his second and third Lemmas, Newton proves the fundamental principle of the integral calculus as applied to the determination of the areas of curves, by showing that if a set of parallelograms, as in the figure, be inscribed in any curvilinear space, the percentage of difference between the sum of their areas and that of the curve may be made as small as we please by diminishing indefinitely the breadth of each parallelogram, and increasing their number proportionally.

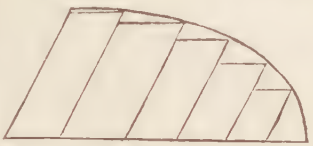


Fig. 2.

Next, he shows how to compare two curvilinear spaces, by supposing them filled with such parallelograms, each of the first bearing to one of the second a constant ratio.

Next, that the homologous sides of similar *curvilinear* figures are proportional.

The sixth Lemma is merely a definition of continuous curvature in a curve, as distinguished from abrupt change of direction.

The seventh, eighth, and ninth Lemmas are of very great importance. The general principle involved in their proof is this—to examine what occurs in indefinitely small arcs, by drawing a magnified representation of them such as always to be on a finite scale, however small the arcs themselves may be. Thus, to show that the chord of a small arc is ultimately equal to the arc—of which we have in Trigonometry (q.v.) as a particular case, the ultimate equality of an arc and its sine—he

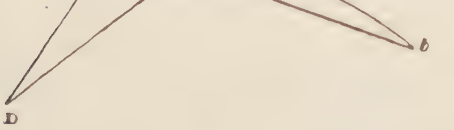


Fig. 3.

proceeds somewhat as follows: Let AB be an arc of continued curvature, AC the tangent at A. Produce the chord AB till it has a *finite* length, A*b*. Describe on A*b*, as chord, an arc similar to AB: this, by a previous lemma, will touch AC at A. Now, as B moves up to A, let the same construction be perpetually made, then *b* will approximate more and more closely to AC (because the arc AB is one of continuous curvature), and the magnified arc will constantly lie between AC and A*b*.

Hence, ultimately, when A*b* and AC coincide in direction, the arc A*b* (which is always between them) will coincide with A*b*. Similarly, AD being any line making a finite angle with AC, draw DBE cutting off a finite length from AD: this process enables us to prove that the triangles AED, and the rectilinear and curvilinear triangles ABD, all are ultimately equal.

Finally (and this is the step of the greatest importance in the dynamical applications), if the lines AD, DE, D′E′ be drawn under the above restrictions, the ultimate ratio of the curvilinear or rectilinear triangles AEB, AE′B′ is that of the squares of corresponding sides. From this, in the ninth and last Lemma, it is easily shown that the spaces described under the action of a finite force have their prime ratios as the squares

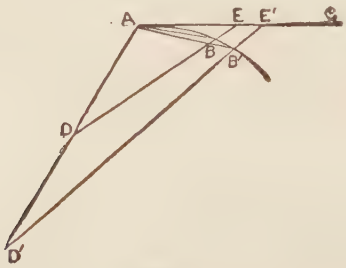


Fig. 4.

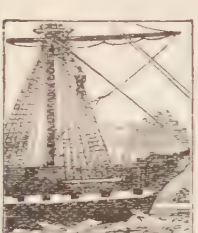
of the times; whence we pass at once to the ever-memorable investigations of the *Principia* regarding the orbits described under the action of various forces.

The method of prime and ultimate ratios is little used now (except in Cambridge Univ., which does honor to itself in making part of the *Principia* a subject of study), as the differential and integral calculus help us to the required results with far greater ease. But to the true student of natural philosophy, the synthetic method of Newton is of very great value, as it shows him clearly at every step the nature of the process that he is carrying out, which is too apt to be lost from sight in the semi-mechanical procedures common to all forms of symbolical reasoning.

RAT'ISBON: see REGENSBURG.

RATITÆ, n. plu. *rā-tī'tē* [L. *rătītus*, marked with the figure of a raft—from *rătis*, a raft]: cursorial birds which do not fly, and have therefore a raft-like sternum without a median keel—the order of birds including the ostrich, emu, cassowary, and apteryx.

RATLINES, n. *rât'linz*, or RATLINGS, or RATTLINGS [name given jocosely by seamen, as though lines for rats to climb on]: in *ships*, steps in the ladders of rope by which sailors ascend from the deck to the mast-heads. They consist of thin cords fastened horizontally at regular distances across the shrouds at an easy step apart, thus forming a convenient ladder. To prevent the ratline slipping, it is commonly tied to the shroud in a peculiar knot called a clove-hitch.



Ratlines.

RATOON, n. *rā-tôn'* [Sp. *retoño*, a ratoon: F. *rejeton*, a young shoot]: a sprout from the root of the sugar-cane, which has been cut: V. to sprout or spring up from the root, as the sugar-cane of the previous year's planting. RATOON'ING, imp. RATOONED', pp. *-tônd'*.

RATSBANE: see under RAT.

RAT-SNAKE (*Coryphodon Blumenbachii*): serpent of family *Colubridæ* (see COLUBER), which is often kept in domestication in Ceylon, for its usefulness in killing rats. Like the rest of its family, it is without poison-fangs. It is capable of being rendered very tame, and shows considerable intelligence.

RAT'-TAIL MAG'GOT: larva of a dipterous insect, *Eristalis tenax*, of family *Muscidæ*. It inhabits mud, and breathes by means of tubes attached in telescope fashion to the tail, which terminates in a brush of hairs, and is always held up to the surface of the water, being elongated when the depth of water increases. The perfect insect is very like a bee. One of the N. American species, in its adult state like a large fly, sometimes is an abundant maggot in water that is foul with decaying animal matter.

RATTAN: see RATAN.

RATTANY: see RATANY.

RATTAZZI, *rât-tât'sē*, URBANO: Italian statesman: 1808, June 29—1873, June 5; b. Alessandria; of a family in the middle class. He was an advocate at Casale, where, 1847, he was pres. of the agricultural committee. After the proclamation of the constitution 1848, he was elected member for Alessandria and began his political career as a democrat. His knowledge, eloquence, and liberal principles raised him to the ministry; and his first act was to write to the bishops, threatening their arrest if they preached against liberty. After the defeat of Novara, he was obliged to retire from the ministry. Napoleon's *coup-d'état* threatened the liberty of Piedmont, and Cavour, R., and their parties joined to

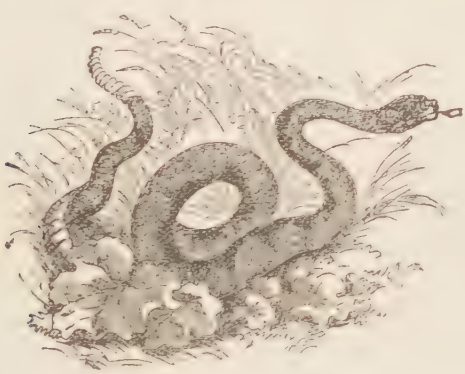
defend it: this union was called *connubio*. R. took the portfolio of minister of justice in the Cavour ministry 1854, and presented the bill for abolition of convents. The priests were up in fierce opposition to him. After the Mazzinian movement 1857, being accused of weakness in suppressing it, he retired, but at the peace of Villafranca he returned to the ministry. He did not wish to accept definitively the annexation of the Duchies, because he knew that the price of it was Savoy and Nice, which he was unwilling to give up; and being, as is alleged, secretly undermined by Cavour and Sir James Hudson, he fell from power. In 1862 R. was intrusted with formation of a new ministry, but had to resign at the end of the year. His policy was an attempt to secure the development of Italian liberty and unity by peaceful and diplomatic means. He opposed Garibaldi's expedition against Rome in that year. He returned to office 1867, but had to resign the same year. A Life by Morelli appeared 1874, and the first volume of another by his wife 1881.

RATTEEN, n. *răt-tēn′* [F. *ratine*]: a kind of woolen stuff, quilled or twilled.

RATTENING, n. *răt′tn-ĭng* [probably from *rat*, in allusion to its destructive propensities]: the form of organized terrorism of trades-unions, which consists in the secret injuring or destruction of the tools or property used in the workshops by those workmen who are non-unionists.

RATTLE, n. *răt′tl* [Ger. *rasseln*; Dut. *ratelen*, to make a collection of sounds as might singly be represented by the syllable *ras* or *rat*: Low Ger. *rattern*, to speak quick and indistinct]: a succession of short noisy sounds, quickly repeated; clattering sounds; loud, rapid, but empty talk; a child's toy; an instr. which produces a clattering noise when shaken: V. to produce a rapid and confused succession of sounds, not sonorous, by the shaking or contact of bodies; to speak rapidly and noisily. RAT′TLING, imp. *-tling*: ADJ. sounding as a rattle: N. noise produced by a quick succession of small sounds not musical, as the wheels of a carriage over a causeway. RATTLINGS: see RATLINES. RAT′TLED, pp. *-tld*. RAT′TLER, n. *-tlĕr*, a giddy noisy person. RATTLES, n. plu. *răt′tlz*, the noise in the throat caused by the air passing through the mucus filling the air-passages, which often precedes death. RED RATTLE, the pasture lousewort; *Pedic′ūlāris sylvatĭca*, ord. *Scrophŭlarĭācĕæ*. YELLOW RATTLE, a common weed in meadows and pastures; *Rhinan′thus Crista galli*, ord. *Scrophŭlarĭācĕæ*. RAT′TLESNAKE, n. *-snāk*, very poisonous Amer. snake (see below). RATTLESNAKE-ROOT, the *Senega* or *Seneka* Root (q.v.).

RATTLESNAKE (*Crotalus*): genus of serpents of family *Crotalidæ*, distinguished from the rest of that family by the rattle at the end of the tail. They are characterized also by having only one row of plates under the tail. The genus is sub-divided by many authors according to the scales and shields with which the head is covered in different species. All the species are American, and all are much dreaded for their deadly venom, though they seldom assail man, unless molested, and the rattle often gives timely warning of danger. The R. is found often at rest in a coiled form, with the rattle somewhat erected from the centre of the coil; and when the snake begins to be irritated, the rattle shakes.



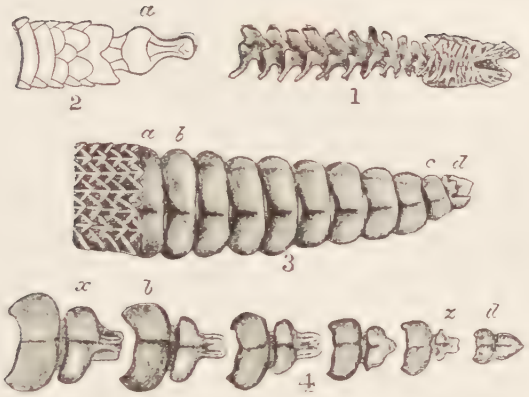
Rattlesnake (*Crotalus horridus*).

Rattlesnakes are generally rather sluggish in their movements; but they are most active and most dangerous in the warmest weather, their bite being more formidable at such a time, as well as more readily inflicted. The effects of the bite are various, according to the condition of the serpent, also according to the constitution of the person bitten, and the place into which the fangs have been inserted—the worst case being when the poison immediately enters a large vein, and so is carried at once to the most vital parts. Death to human beings has been known to ensue in a few minutes; in other cases, hours or days have elapsed, and sometimes the sufferer recovers. Almost all animals show dread of the R., and great unwillingness to approach it. Hogs and peccaries, however, are so far from fearing it that they kill and eat it, finding safety from its venom probably not in any peculiarity of constitution, but in their thickness of skin and the thickness of the layer of fat under the skin. Rattlesnakes are viviparous, and show attachment to their young. It is very doubtfully said of them, as of the viper, that on the appearance of danger the mother receives her young ones into her mouth

and gullet, or stomach, ejecting them again uninjured when the danger is past. The power of Fascination (q.v.) has not been more frequently ascribed to any kind of serpent.

The rattle is a very peculiar appendage. It consists of a number of thin horny cells, jointed together; each, except the terminal one, of conical form, and in great part covered by that next to it, against the sides of which its apex strikes when the rattle is shaken, so as to produce a rattling noise. The number of joints in he rattle increases with the age of the serpent, one being added not with each year, but at each casting of the skin. One species of R. (*Crotalus horridus*), called sometimes the CARCAVELA, is found in the warm parts of N. and S. America. Its muzzle is covered by three or four pairs of plates. Its scales have a sharp elevated keel. It attains a length of eight ft., though it is seldom found of so great a size. Its color is yellowish brown above, with a broad dark streak on each side of the neck, and a series of broad lozenge-shaped spots on the back.—Another species, *Crotalus* or *Uropsophus durissus*, extends further northward, as far as the s. shores of the great lakes e. of the Mississippi river, and is the most common. The Prairie R. (*C. tergeminus*) is not regarded as having so dangerous virus as that of the eastern species. It is of pale-brown color, with a dark streak across the temples, and dark spots on the body, often assuming the form of bands; the keel of the scales not so strongly developed, and the muzzle with fewer shields than in the former species, which it resembles in size. A third species, *Crotalus* or *Crotalophorus miliaris*, having the head completely covered with large shields, also is common in many parts of N. America, and is as much dreaded as those already named, notwithstanding its much smaller size, because the sound of its rattle is so feeble as not readily to attract attention; but its bite is not fatal to man. It is small, of brownish-olive color, with brown spots on the back and sides, the belly black. The Diamond R. (*C. adamanteus*), N. Car. to Fla., is the largest and fiercest; it lives near water. In the colder countries which they inhabit, rattlesnakes spend the winter in a torpid state, retiring for that purpose into holes, or hiding themselves among moss. The poison of R. changes the character of the blood, and depresses the nervous system; hence the use of stimulants to give temporary tone. The immediate treatment of the wound is to suck it, followed by application of ammonia, or cauterizing with lunar caustic. A hunter applied gunpowder to the wound and set it burning. Large draughts of alcohol are taken, which otherwise would be as fatal, perhaps, as the bite, but with the result of successfully tiding over the poison.

RATZ BÖSZÖRMENY': see BÖSZÖRMENY.



Rattle of **Rattlesnake** (after Czermak).

Fig. 1. Caudal vertebræ, the last coalesced in a single bone, a.

Fig. 2. End of tail (rattle removed); a cuticular matrix covering terminal bone.

Fig. 3. Side view of rattle, c and d like oldest, a and b the youngest joint.

Fig. 4. A rattle with joints disconnected; x fits into b, and is covered by it; z into d in like manner.

Ray (*Pristis perrotteli*).

Torpedo **Ray** (Mediterranean), a portion of the skin on the left side removed to show the electric organ.

RAUCH, *rowch*, CHRISTIAN DANIEL: distinguished German sculptor: 1777, Jan. 2—1857, Dec. 3; b. Arolsen, cap. of the principality of Waldeck. He early began the study of sculpture; but on the death of his father 1797, he was obliged to go to Berlin, where he became valet to Frederick-William II., King of Prussia. On the death of that prince, R. determined to follow his inclination for the fine arts. In this he was assisted by the new king Frederick-William III., who afforded him facilities for designing and modelling statues, and recommended him as a pupil in the Acad. of Fine Arts. A statue of Endymion and a bust of Queen Luise of Prussia, executed at this time, convinced the king of R.'s abilities, and he gave R. the means for proceeding to Rome for study. There R. spent six years, working with assiduity, to render himself worthy of the friendship of Thorwald-sen and Canova. At Rome, he was favored with the friendship of William von Humboldt, Prussian minister there.

Among his works at this time were bassi-rilievi of *Hippolytus and Phædra*, a *Mars and Venus Wounded by Diomedes*, a colossal bust of the king of Prussia, and busts of Raphael Mengs and the Count de Wengersky. In 1811 he was called by the king of Prussia to Berlin to execute a monumental statue of Queen Luise. This great work obtained for R. a European reputation. It is placed in the mausoleum of the queen in the garden of Charlottenburg. R., however, not satisfied with this triumph, commenced a new statue of the queen, which he finished 11 years afterward, and which is a conceded masterpiece of sculpture. It is in the palace of Sans-Souci, near Potsdam. R., after this, lived principally at Berlin, occasionally visiting Rome, Carrara, and Munich. He labored indefatigably, and by 1824 had executed 70 busts in marble, of which 20 were colossal.

R.'s principal works, besides the above, are—two colossal bronze statues of Field-Marshal Blücher, one of which was erected with great solemnity at Breslau 1827; bronze statue of Maximilian of Bavaria, erected at Munich 1835; and statues of Albert Dürer, Goethe, Schiller, and Schleiermacher, erected in various places in Germany. His greatest work is the magnificent monument of Frederick the Great, which adorns Berlin. The model for this statue was designed by R. in conjunction with Professor Schinkel, the architect, 1830; and after 20 years' labor, the statue was finished 1850, and was inaugurated with great pomp 1851, May. Of this statue a critic writes: 'An air of resistless majesty ennobles the mean countenance, and a bold and skilful treatment hides the absurdity of the garb.' In his works, R. surmounted the difficulties which modern costume opposes to the ideal representation of personages of the present age; and while preserving the salient points of his model, he possessed the art of sacrificing the less important details to the exigences of the beautiful. He died at Dresden. See his Life by Eggers.

RAUCOUS, a. *raw'kŭs* [L. *raucus*, hoarse: It. *rauco*: F. *rauque*: Skr. *ru*, to utter a sound]: hoarse; rough; harsh. RAU'COUSLY, ad. *-li*. RAUCITY, n. *raw'si-ti*, hoarseness; a loud rough sound.

RAUGHT, v. *rawt*: the OE. pp. of REACH, now REACHED, pp. [see REACH]: extended; touched with the hand extended; stretched forth.

RAUHES HAUS, *row'ĕss howss*: great institution founded and till 1881 managed by Wichern at Horn, near Hamburg, in connection with the German Home Mission (*Innere Mission*). It is partly a refuge for morally neglected children; partly a boarding-school for moral and intellectual education of children of the higher classes; lastly, a training-school for those who wish to become teachers or officials in houses of correction, hospitals, etc., in promotion of the objects of the Home Mission. The first foundation of this model institution—for such it has become for Germany as well as for France—was laid by a wealthy citizen of Hamburg, who made over to it a piece of land. It was opened 1831, Nov. 1, by Wichern, with 12 morally neglected children. By addition of new houses, the whole has been very much enlarged, and has of late grown almost into a colony. A printing-office, a bookbinder's shop, and bookselling form part of the institution. Recently, about 100 neglected children (one-third are girls) received their education in the establishment. They live in families of 12, each family under the paternal superintendence of a young artisan, who employs the children according to their capabilities, partly in indoor, partly in outdoor, manual labor. The watching and care of these children devolve on assistants, who also take part in the instruction of the institution, with a view to prepare themselves for the work of the Home Mission in other institutions. These instructors receive board and clothing, but no salary. In connection with the R. H., there was founded 1845 a kind of conventual institute for education of young men to become heads or superintendents of similar institutions. Entrance into this institution is limited to the age of 20–30 years. Besides religious belief and good character, freedom from military duties, bodily and mental health, some scholastic acquirements, and a knowledge of some craft or of agriculture, are required. The boarding-school was established 1851, and at the same time a seminary was founded, in which 12 brethren of the R. H. are especially prepared for school-work.

RAUMER, *row'mĕr*, FRIEDRICH LUDWIG GEORG VON: German historical writer: 1781, May 14—1873, June 14; b. Wörlitz, near Dessau. He studied law and polit. economy at Halle and Göttingen; filled different law appointments (1806–11); and was appointed prof. at Breslau. In 1819 he was called to Berlin as prof. of history and polit. economy. Among his writings are —*Sechs Dialoge über Krieg und Handel* (1806); *Das Bri-*

tische Besteuerungssystem (Berl. 1810); *The Orations of Æschines and Demosthenes de Corona* (Berl. 1811); *CCI Emendationes ad Tabulas Genealogicas Arabum et Turcarum* (Heidelb. 1811); *Handbuch merkwürdiger Stellen aus den lat. Geschichtsschreibern des Mittelalters* (Handbook of Remarkable Passages in the Latin Historians of the Middle Ages, Bresl. 1813); *Vorlesungen über die alte Geschichte* (Lectures on Anc. History, 2 vols. Leip. 1847); *Geschichte der Hohenstaufen und ihrer Zeit* (History of the Hohenstaufen Dynasty and their Time, 6 vols. Leip. 1823-25); *Über die geschichtliche Entwickelung der Begriffe von Recht, Staat, und Politik* (On the Historical Development of the Ideas of Law, State, and Politics, 2d ed. Leip. 1832); *Prussian Municipal Law* (Leip. 1828); *Briefe aus Paris und Frankreich* 1830 (2 vols. Leip. 1831); *Briefe aus Paris zur Erläuterung der Geschichte des* 16 *und* 17 *Jahrh.* (2 vols. Leip. 1831); *Geschichte Europas seit dem Ende des* 15 *Jahrh.* (History of Europe from the End of the 15th C., vols. 1–8, Leip. 1832–50); *England*, 1835 (2 vols. Leip. 1836); *England*, 1841 (3 vols. Leip. 1842); *Beiträge zur Neuern Geschichte aus dem Brit. Museum, &c.* (5 vols. Leip. 1836-39); *Italien: Beiträge zur Kenntniss dieses Landes* (2 vols. Leip. 1840); *Die Vereinigten Staaten von Nordamerika* (2 vols. Leip. 1845); *Antiquarische Briefe* (Leip. 1851); *Handbuch zur Geschichte der Literatur* (1864–66). He also edited the *Historisches Taschenbuch*, etc. The unfavorable reception of an oration of R. in honor of King Frederick II. compelled him, 1847, to resign the secretaryship of the Acad. of Sciences at Berlin. R. was a member of the Frankfurt parliament, where he belonged to the right centre. Subsequently he became ambassador at Paris, and then member of the first chamber at Berlin. In 1853, he became prof. emeritus at the Univ. of Berlin. He died in Berlin.—His bro. Karl Georg von R. (1783–1865, b. Wörlitz) was prof. of mineralogy, etc., at Breslau 1811, Halle 1819, and Erlangen 1827. His geological, geographical, and pedagogical writings gave him wide reputation.

RAUPACH, *row'pâch*, Ernst Benjamin Salomo: German dramatist: 1784, Apr. 21—1852, Mar. 18; b. Straubitz (Silesia). He received his education in the Gymnasium at Liegnitz, studied theology at Halle, was for ten years tutor in Russia, held lectures at St. Petersburg Univ., and was subsequently (1816) appointed there prof. of philosophy, German literature and history. R. left Russia 1822. He died at Berlin. His plays—tragedies and comedies—show great knowledge of stage-effect, talent for invention of new and interesting situations, vivid dramatic diction, and fine play of verbal wit.

RAVAGE, n. *răv'āj* [F. *ravage*, spoil—from *ravir*, to snatch, to seize—from L. *rapĕrĕ*, to seize and carry off]: destruction by violence or by decay; spoil; ruin; havoc; waste: V. to lay waste; to pillage; to destroy. RAV'AGING, imp. RAV'AGED, pp. *-ājd*. RAV'AGER, n. *-ā-jĕr*, one who ravages; a plunderer.—SYN. of 'ravage, v.': to desolate; despoil; plunder; sack; pillage; waste; ruin; destroy; devastate; spoil; consume.

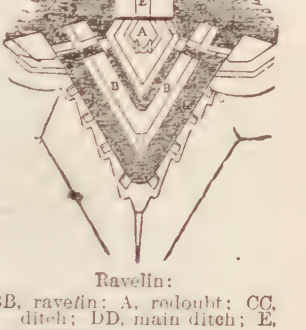
RAVAILLAC, *râ-vâl-yâk'* or *râ-vâ-yâk'*, FRANÇOIS: 1578–1610, May 27; b. in the French province of Angoulême; murderer of Henri IV. of France. In early life, having fallen into debt, he was thrown into prison, the confinement and restraint of which preyed on his health, and produced hallucinations. Under mental excitement, he renounced all secular pursuits and applied for admission among the Jesuits, but was refused as a visionary. His insane hatred of the Huguenots, as enemies of the church, was directed especially against Henri of Navarre, their former leader. Having resolved to assassinate the king, he watched his opportunity, and 1610, May 14, as the king was passing in his coach through the narrow street of Laferronnerie, stepped upon the right hind wheel of the carriage at the moment that it was delayed by a heavy wagon in front, and leaning forward, he plunged a knife into the breast of the king. The first blow glanced aside, but at the second thrust, the knife entered the heart. R. escaped in the confusion, but being soon captured with the knife in his hand, he admitted his guilt; and having been formally tried and condemned, he was put to the torture; and suffered a cruel death in the Place de Grève, his body being torn asunder by horses. R. refused to the last to acknowledge whether he had had instigators; hence the widest scope was given to conjecture, suspicion being in turn directed to the queen, Marie de' Medici, and her favorites, the Concini, to the Duc d'Epernon, and to the Spanish court and their Jesuit advisers; but ground is lacking for such suspicions. Henri Martin (*Histoire de France*) and Poirson (*Histoire de Henri IV., tome II.*) have examined with scrupulous impartiality the particulars of the process instituted against R., and have come to the conclusion that the cause of the crime was fanaticism degenerated into monomania.

RAVANA, *râ'va-na* [from the causal of the Sanskrit *ru*, cry, alarm, hence literally he who causes alarm]: name of the *Râkshasa* (q.v.) who, at the time of Râma, ruled over Lankâ or Ceylon, and having carried off Sîtâ, the wife of Râma, to his residence, was ultimately conquered and slain by the latter. R. is described as having been a giant with ten faces, and as having obtained from S'iva, by austerities and devotion, a promise which bestowed on him unlimited power, even over the gods. As the promise of S'iva could not be revoked, Vishn'u evaded its efficacy in becoming incarnate as Râma, and killed the demon-giant. See VISHN'U; RAKSHAS.

RAVE, v. *rāv* [OF. *ravacher* or *ravasser*, to rave, to talk idly: F. *rêvasser*, to have troubled dreams: Dut. *ravelen*, to rave, to dote: Gael. *rabhd*, idle wild talk: L. *rabiēs*, rage, madness]: to act or talk senselessly; to talk irrationally; to speak or exclaim furiously; to wander in mind or intellect; to dote. RAV'ING, imp.: ADJ. delirious: N. delirium. RAVED, pp. *rāvd*. RAV'ER, n. *-ėr*, one who raves. RAV'INGLY, ad. *-lī*.

RAVEL, v. *răv'l* [F. *raveler*; It. *ravagliare*, to ravel out: Dut. *ravelen*, to ravel out, to talk confusedly]: to become confused and entangled, as thread; to entangle; to involve; to untwist or unweave, followed by *out*; to fall into perplexity or confusion; to be unwoven. RAV'ELLING, imp.: N. the act of untwisting; that which is ravelled out. RAV'ELLED, pp. *-ld*.

RAVELIN, n. *răv'lin* or *răv'ė-lin* [F. *ravelin*—from old It. *ravellino*; It. *ricellino*, a wicket or postern gate: perhaps from L. *re*, back; *vallum*, a rampart]: in *fortification*, a detached triangular work of less elevation than the main defenses, situated with its salient angle to the front before the curtain, which, with the shoulders of the adjoining bastions, it serves to protect. It is open at the rear, so as to be commanded by the curtain, if taken, and is separated from that work by the main ditch, while in its own front the ditch of the R. intervenes between itself and the covert-way. The guns of the R. sweep the glacis, and perform a very important function in commanding the space immediately before the salient angles of the two next bastions, ground which the guns of the bastions themselves cannot cover. The bastions, on the other hand, flank the R. See FORTIFICATION.



Ravelin:
BB, ravelin; A, redoubt; CC, ditch; DD, main ditch; E, passage.

Some writers derive R. from *vagliare*, to watch, and think it probable that the R. was at first a watch-tower.

RAVEN, v. *răv'ėn* [Ger. *rauben*, to spoliate: prov. F. *rabina*, violence, impetuosity: F. *ravir*, to snatch—from L. *rapĕrĕ* (see RAVAGE)]: to devour with great eagerness; to eat voraciously; to prey with great rapacity. RAVENING, imp. *răv'ėn-ing*: ADJ. preying with violence: N. violence; propensity to plunder. RAV'ENED, pp. *-ėnd*. RAV'ENER, n. *-ėn-ėr*, one who or that which plunders. RAVEN, or RAVIN, n. *răv'in*, prey; plunder. RAV'ENOUS, a. *-ėn-ŭs* [prov. F. *ravineux*, impetuous, violent]: eating with indecent haste and greediness; furiously voracious or eager. RAV'ENOUSLY, ad. *-lī*. RAV'ENOUSNESS, n. state or quality of being ravenous; extreme voracity.

RAVEN, n. *rā'vn* [AS. *hræfn*; Icel. *hrafn*; Ger. *rabe*; OHG. *hraban*, a raven: Dut. *raven*, to croak: L. *ravus*, hoarse]: species of Crow (q.v.), remarkable for large size. The American R. (*C. carnivorus*) differs little from the European; it averages 25 in. in length, and ranges from British America to Mexico. Unlike the crow, it does not congregate in large flocks. The Colorado R. (*C. cacalotl*) may be but a variety of the American R., somewhat larger, and occurring west and south. The White-necked R. (*C. cryptoleucus*) of Tex. and Mex., has the base of the feathers white, on neck, breast, and back. The European R. (*C. corax*) is more than two ft. in length from the tip of the bill to the extremity of the tail. The bill is thick and strong, compressed at the sides; the mandibles are sharp at the edges; the upper mandible is curved at the tip, and exceeding the lower in length. The base of the bill is surrounded with

Raven (*Corvus corax*).

feathers and bristles. The tail is rounded, but the middle feathers are considerably the longest. The wings are long—extending from tip to tip to 52 inches—the fourth quill-feather being longest. The color is a uniform black, with more or less metallic lustre, conspicuous particularly in the elongated throat-feathers of the male, and lacking in the whole plumage of the female and young.

The R. is a bird of wide geographic distribution. It is found in almost all parts of the n. hemisphere, but most abundantly in the more n. and mountainous parts. In other parts of the world, and within the n. hemisphere itself, however, closely allied species have probably been often mistaken for it. There are several species of crow very similar to the R. in color, size, and habits.

The R. is seen generally either solitary or in pairs.

It is one of the most thoroughly omnivorous of birds: it feeds on fruits and nuts in forests; it picks up worms or mollusks; it sucks eggs; it kills young hares, or even lambs; it rejoices in carrion, and frequently attacks weak or sickly beasts, almost invariably choosing their eyes as its first point of assault. It generally makes its nest of sticks, coarse weeds, wool, hair, etc., in rocky places, on a narrow ledge of a precipice, or in some similar situation. Ravens are occasionally captured when young, and become interesting pets, remarkable for their impudence and cunning, their look of sage thoughtfulness, their inquisitiveness, their mischievous propensities which prompt them to destroy everything that can be destroyed, and always as if the fact of its destruction afforded them pleasure, their thievishness, their love of glittering things, and their power of imitating human speech, which is almost equal to that of parrots. The R. is noted for longevity, and instances are on record of ravens which have certainly lived 70 or 80 years. The R. has been generally reckoned a bird of ill-omen, probably both for its color and its extremely harsh, croaking voice, sometimes heard in fine weather as if coming from the sky, the R. being a bird of powerful wing, and often soaring high in air.

RAVENNA, *rȧ-vĕn'nȧ*: province of n.e. Italy, in the division of Emilia, and bordering on the Adriatic; 742 sq. m. The Montone, on which the cap., Ravenna, is situated, the Santerno, Savio, and a number of other small rivers, pass through it. Its principal products are grain, rice, flax, hemp, coriander seeds, and anise. Pop. (1872) 221,115; (1892) 223,478.

RAVEN'NA: important city of central Italy, 43 m. s.e. from Bologna, 4½ m. from the Adriatic; lat. 44° 24′ n., long. 12° 12′ e. It is in a well-watered, fertile, and finely-wooded plain. R. is surrounded by old bastions, and by walls where are still seen the iron rings to which cables of ships were formerly fastened: the sea is now about 4 m. from the city. The streets are wide; the squares are adorned with statues of the popes, and the houses have a gloomy appearance. R. is an ancient city, very rich in monuments of art. The cathedral, built in the 4th c., was almost wholly rebuilt 1734; it has five naves supported by 24 marble pillars. Of the other 14 churches and other architectural antiquities several date from the 5th and 6th c. The church of San Francesco possesses the tomb of Dante, erected in the 15th c. The churches of R. present an exterior of brick plain and unattractive; but the interior delights the artistic eye with lines of columns, arches, carved capitals, and exquisite mosaic pictures. The library of R. contains 50,000 vols. It has an archæological museum, and many educational institutions. R. has manufactures of silk, and its trade is facilitated by a canal to the sea.

R. was probably of Umbrian origin; it was at least an Umbrian city when it passed into the hands of the

Romans. Augustus made it a first-class seaport and naval station; 400 years later, Emperor Honorius took refuge there, and made R. the cap. of the empire. The city was taken by Odoacer, then by Theodoric and by Totila; Totila was conquered by Narses, who made it the residence of the exarchs 553. In 1218, it became a republic. In 1275, Guido da Polenta conquered it, and there established his court, where he received Dante. R. was afterward taken by the Venetians, who kept it till 1509. Under Charles V., it passed into the hands of the popes. Under the walls of R., a great battle was fought 1512 between the French and the Spaniards, in which Gaston de Foix purchased victory with his life.—Pop. (1881) town proper 34,270; commune (1893) 66,239.

RAVENSBURG, *rä'vénz-bûrch:* town in Würtemberg, in the Circle of the Danube, pleasantly situated in the fertile Schussenthal valley. The principal industries are manufactures of cottons, woolens, and paper. Pop. (1885) 11,483; (1890) 12,267.

RAVENSCROFT, *rā'vénz-krŏft*, THOMAS: English musical composer: 1592—about 1640. He received his musical education in St. Paul's choir, and had the degree bachelor of music conferred on him when only 15 years of age. In 1611, appeared his *Melismata, Musical Phansies, etc.*, collection of 23 part-songs, some of them of great beauty; three years later, he brought out another collection of part-songs under the title *Brief Discourses*, with an essay on the old musical modes. Turning his attention to psalmody, he published 1621 a collection of psalm-tunes for four voices, entitled *The Whole Book of Psalms, composed into Four Parts by Sundry Authors to such Tunes as have been and are usually sung in England, Scotland, Wales, Germany, Italy, France, and the Netherlands.* This was the first publication of its kind, and all similar works of later date have been largely indebted to it. Among contributors to this collection were Tallis, Morley, Dowland, and all the great masters of the day; the name of John Milton, father of the poet, appears as the composer of York and Norwich tunes; while St. Davids, Canterbury, Bangor, and many others which have since become popular, are by R. himself. Each of the 150 Psalms has a distinct melody assigned it. Two collections of secular songs similar to the *Melismata*, and entitled *Pammelia* and *Deuteromelia*, have been assigned to R.; but it is probable that only a few of these songs were composed by him, though he may have revised and edited the whole. A selection from the *Melismata, Brief Discourses, Pammelia*, and *Deuteromelia* was printed by the Roxburghe Club 1823.

RAVEN'S DUCK: kind of sail-cloth.

RAVIGNAN, *rȧ-vēn-yŏng'*, GUSTAVUS FRANCIS XAVIER DELACROIX DE: celebrated preacher of the Jesuit order: 1795, Dec. 2—1858, Feb. 26; b. Bayonne, France. He studied in the Lycée Bonaparte at Paris; entered the legal profession, obtained his degree, was named auditor of the cour royale at Paris; and 1821, received an appointment in the tribunal of the Seine. The prospect thus opened for him, however, soon lost its attraction, and 1822 he resolved to relinquish his career at the bar, and enter the priesthood. Having spent some time in the College of St. Sulpice, he soon passed into the novitiate of the Jesuits at Montrouge, thence to Dole and St. Acheul for theological studies, at the termination of which he was appointed a professor. On the expulsion of the Jesuits from France 1830, R. withdrew to Freiburg in Switzerland, where he taught in the schools of his own order; but after some time he was transferred to the more congenial duty of preaching, first in several Swiss towns, afterward in Savoy, at Chambery, at St. Maurice, and other places. At length, 1835, he appeared in the pulpit of the cathedral of Amiens. In the following year, he was chosen to preach the Lenten sermons at the church of St. Thomas d'Aquin in Paris; and finally, 1837, was selected to replace Lacordaire (q.v.) at Notre Dame, in the duty of conducting the special 'conferences' for men which had been opened in that church. For ten years, Père de R. occupied this pulpit with a success rarely equalled, and his 'conferences' are regarded as models of ecclesiastical eloquence. In 1842, he undertook in addition to preach each evening during the entire Lent; and it is to the excessive fatigue thus induced that the premature failure of his strength is ascribed. To the labors of the pulpit, he added those of the press. He published an Apology of his order 1844; and 1854 a longer work with the same view, *Clement XIII. et Clement XIV.*, 2 vols. 8vo. intended as a reply to the *Life of Clement XIV.*, by the Oratorian Father Theiner. These, with some occasional sermons and 'conferences,' are all his publications during his life. In 1855, he was invited by Emperor Napoleon III. to preach the Lent at the Tuileries. He died in the convent of his order at Paris. His Memoirs were written by Poujoulat (1858), and by Père de Ponleroy (2 vols. 1860); a translation of the last was published New York 1873.

RAVIN, v. *răv'ĭn* [see RAVEN 1]: in *OE.*, to prey with great rapacity; same as RAVEN 1: ADJ. in *Shakespeare*, for ravenous: N. in *OE.*, prey; plunder.

RAVINA'LA: see TRAVELLER'S TREE.

RAVINE, n. *rȧ-vēn'* [F. *ravin*, gutter caused by a flood; *ravine*, a great flood: It. *rovina*, ruin, decay: L. *rŭīna*, ruin: also said to be derived from L. *răpīna*, plunder, violence—from *rapĕrĕ*, to seize]: a deep hollow formed by the action of a stream; the narrow channel of some mountain stream; a gorge; a mountain-cleft.

RAVISH, v. *răv'ish* [F. *ravir*, to snatch, to seize; L. *rapĕrĕ*, to seize and carry off: It. *arruffare*, to ravish (see RAVAGE)]: to fill with great joy and delight; to entrance; to enrapture; to have sexual intercourse with a woman by force and against her consent; to violate; in *OE.*, to take away by violence. RAV'ISHING, imp.: N. the act of one who ravishes; rapture; transport. RAV'ISHED, pp. *-isht*: ADJ. delighted to rapture. RAV'ISHER, n. *-ĕr*, one who ravishes. RAV'ISHMENT, n. *-mĕnt*, forcible violation of chastity; transport of delight. RAV'ISHINGLY, ad. *-lĭ*, with rapture.—SYN. of 'ravish': to enrapture: delight; transport; entrance; deflower; force; violate.

RAW, a. *raw* [AS. *hreaw*; Dut. *rouw*, rough, raw: Ger. *rauh*; It. *ruvido*, rough, raw: L. *rudis*, rough, unwrought]: not roasted, boiled, or cooked; unprepared; not altered from its natural state; not manufactured; not spun or twisted; not mixed; bare of skin or flesh; immature; inexperienced; bleak; chilly; cold, with damp. RAW'ISH, a. *-ĭsh*, rather raw. RAW'LY, ad. *-lĭ*, in a raw manner; unskilfully; without care. RAW'NESS, n. *-nĕs*, the state of being raw; uncooked; state of being inexperienced; chilliness with dampness. RAW-BONED, a. having little flesh on the bones; lean and large-boned. RAW'HEAD, n. *-hĕd*, a spectre or goblin. RAW'HIDE, n. *-hīd*, cow-hide or coarse riding-whip, made of untanned leather, twisted.—SYN. of 'raw': uncooked; unroasted; sore; immature; unripe; inexperienced; unskilled; undisciplined; bleak; chill; unspun; untwisted; unadulterated; unmixed.

RAWAL PINDI, *raw'al pĭn'dē*, or RAWUL PINDEE, *raw'ăl pĭn'dē*: municipal town of the Punjab, in the doab between the rivers Indus and Jhelum. It is the cap. of a rugged mountainous district on a spur of the Himalayas, and gives name to a large division; and it has active transit-trade with Afghanistan. Here was held 1885 a great durbar or review, at which the Ameer of Afghanistan met the Gov.gen. of India. The dist. contains many of the towns connected with the Punjab campaign of Alexander the Great.—Pop. town (1881) 52,980; (1891) 73,460.

RAWITSCH, *râ'vĭch*: town of Prussia, govt. of Posen, 64 m. south of the city of Posen. R. has manufactures of tobacco. Pop. (1880) 12,260.

RAWLE, *rawl*, WILLIAM, LL.D.: lawyer: 1759, Apr. 28—1836, Apr. 12; b. Philadelphia; great grandson of Francis R., colonist (1660-1727). He studied law in London; was admitted to the bar in Philadelphia 1783; became U. S. dist.atty. for Penn. 1791; declined office of U. S. dist. judge 1792; was chancellor of the Law Assoc. of Philadelphia 1822 till his death; and was one of a commission to revise the civil code of Penn. He was a member of many charitable and educational societies; and among his numerous publications was a translation from the Greek of Plato's *Phædo*.—His sons, WILLIAM

R. (1788–1855) and WILLIAM HENRY R., LL.D. (1823–89), attained eminence in the same profession.

RAWLINS, *raw'linz*, JOHN AARON: soldier: 1831, Feb. 13—1869, Sep. 9; b. East Galena, Ill. He was largely self-educated, studied law, entered politics, and at the outbreak of the civil war made a speech which is said to have strongly influenced Ulysses S. Grant to enter the army. During the war he was closely connected as officer and associated as intimate friend with Gen. Grant, who had great admiration of his character, and very high estimation of his soldierly abilities. By various promotions he reached the rank of brig.gen. U. S. army, and was brevetted maj.gen. 1865. He was sec. of war under Pres. Grant from 1869, Mar. 9, till his lamented death. A bronze statue was erected at Washington to his memory.

RAWLINSON, *raw'lin-son*, GEORGE, M.A.: historian and Chh. of Eng. clergyman: born Chadlington, Eng., 1815, Nov. 23. He graduated at Oxford 1838; was for several years fellow of Exeter Coll. and tutor; appointed public examiner 1854, and Camden prof. of anc. history at Oxford 1861. He was made canon of the cathedral of Canterbury 1872. R.'s writings have gained great favor with the public in Britain and America. He was associated with his bro. Sir Henry R. and Sir George Wilkinson in preparing an annotated Eng. translation of the *History* of Herodotus. He has published a series of Bampton lectures on *The Historical Evidences of the Truth of the Scripture Records*; *The Five Great Monarchies* (Chaldea, later he added a *History of the Parthian Empire*, and *The Seventh Great Oriental Monarchy*); *The Origin of Nations*; *History of Egypt*; *Religions of the Ancient World*; *Egypt and Babylon*; *Topography of the Bible*; *Moses, His Life and Times*; he has contributed to Smith's *Dictionary of the Bible*, *The Speaker's Commentary*, etc.

RAWLINSON, SIR HENRY CRESWICKE, G.C.B., D.C.L., LL.D.: 1810, Apr. 11—1895, Mar. 5: oriental scholar and diplomat: b. Chadlington, Oxfordshire, Eng. He entered the E. India milit. service 1826, and 1833 assisted in reorganizing the army of the Shah of Persia. He had early applied himself to eastern languages and antiquarian researches, and when stationed at Kermanshah 1835, he began to study the Cuneiform (q.v.) inscriptions of Persia. He announced his Cuneiform discoveries 1837–8 to the Royal Asiatic Soc of London, and published his travels in Susiana in the *Geog. Society's Journal*. He also made a translation of the Behistun inscription, a most important event in the history of the study of the old Persian languages. After residing as political agent at Candahar (1840–42) and Bagdad (from 1843), he returned to England with the rank of consul-gen. 1855. In 1858, he was elected M.P. for Reigate, but soon vacated his seat on being appointed a member of the Council of India. In 1859, he proceeded to Teheran as envoy-extraordinary and minister-plenipotentiary to the court of

the shah. He was returned to parliament as member for Frome, and retained his seat till 1868. 1871–73 R. was pres. of the Royal Geog. Soc. R. was the author of a large number of most valuable papers on geography, archæology, history, and modern politics connected chiefly with Persia and the surrounding countries. The greater number of these were read to learned societies; others appeared in periodicals. He also wrote *England and Russia in the East* (1875); but did not confine his attention to eastern subjects, and his addresses to the Geog. Soc. show his varied and extensive acquirements. He was admitted as corresponding member of the Institute of France 1837, and 1852 was made chevalier of the Order of Merit by the king of Prussia. In 1878 he was made a trustee of the Brit. Museum; in 1889 received the grand Cross of the Bath, and 1891 was created a baronet.

RAW SIENNA: see under TERRA.

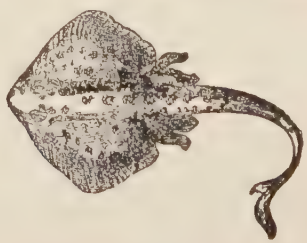
RAX, v. *răks:* in *Scot.* and *prov. Eng.*, to stretch; to extend at length, as the body; to reach. RAX'ING, imp. RAXED, pp. *răkst.*

RAY, n. *rā* [OF. *raye;* F. *rai,* a beam of the sun: L. *radius;* It. *raggio,* a ray: Sp. *rayo,* a beam of light; *raya,* the stroke or dash of a pen]: a line of light; something that shoots forth as from a centre; a gleam of intellectual light; apprehension; perception; in *bot.,* the outer flowers in umbels, when differently formed from the inner: V. to shoot forth in lines; to streak. RAY'ING, imp. RAYED, pp. *rād.* RAY'LESS, a. *-lĕs,* destitute of rays.

RAY, v. *rā:* in *OE.*, for BEWRAY, which see.

RAY, n. *rā:* in *OE.*, for ARRAY, which see.

RAY, n. *rā* [F. *raie;* Sp. *raya;* L. *raia,* a ray], (*Raia*): Linnæan genus of cartilaginous fishes, belonging to order *Plagiostomi* (q.v.) of Müller, and now divided into a number of genera, which form the family *Raiidæ* of many naturalists, and the sub-order *Raiæ* of some. The true rays have a flat body; the pectoral fins are large and fleshy,



Starry Ray (*Raia Radiata*).

appearing as lateral expansions of the body, and with it forming a circular disk or a rhomboid, to which is attached

a rather long and slender tail. The pectoral fins are prolonged till they meet in front of the snout, and backward till they join the ventral fins. The eyes look upward, and the spout-holes or spiracles also are directed upward. The gill-openings, five in number, are on the under side of the body, where also is the mouth. The gills are close behind the mouth; and toward the tail are the stomach, intestines, and other viscera, in a circular cavity. The males are furnished with claspers. The eggs are large, resembling those of sharks, but more rectangular in form; thin horny cases, with projections at each of the four corners, having such resemblance to a hand-barrow, that on some parts of the English coast they receive the name *Skate-barrows*. They are also familiarly known as *purses*, and are very often seen cast by the waves upon the beach. Rays live mostly near the bottom of the sea, and where the bottom is sand or mud. When disturbed, they glide in an undulating manner, and defend themselves against assailants by lashing with the tail, which is generally armed with spines, and in some species—*Sting Rays* (q.v.; family *Trygonidæ* of some naturalists—carries a single long and strong spine, notched on both sides, a formidable weapon used somewhat as a saw. Rays are very voracious; they devour fishes, mollusks, and crustaceans. Many of the rays are popularly called SKATE. All are edible; some, however, are much better food than others; and while on some coasts they are regularly used for food and brought to market, on others they are rejected and thrown out to decay on the beach. There are eight or more species of R. on the Atlantic coast of N. America, including the Sting R. (*Trygon centrura*), as far n. as Cape Cod, sometimes 5–6 ft. across, and its length with tail 10 ft.; the common Stingaree of the s. Atlantic and Gulf (*T. sabina*), of equal size, and ascending rivers; the Butterfly R. (*Pteroplatea maclura*), 10–12 lbs., with great transverse extent but very short tail; the Eagle R. of several species, such as the Whipparee of the south (*Rhinoptera quadriloba*) 6–7 ft. across, and the smaller Sharp-nosed R.; the Devil-fish (*Manta birostris*), sometimes 30 ft. or more in width, and, when entangled, towing small vessels out to sea. Of skates, there are five species on our Atlantic coast, the fleshy flaps of one species, the Barn-door Skate (*Raia laevis*), being esteemed as food. A Torpedo or 'Cramp-fish' (*Torpedo occidentalis*), able to knock a man down by its shock, occurs as far n. as Cape Ann. On the Pacific coast, besides the Devil-fish, are four sting rays, seven true rays, and the *Torpedo Californica*. The French of San Francisco are fond of the R. as food, and the Chinese and Mexicans preserve and eat the tail of one of the sting rays. The sawfish belong to the rays, having special relation to the sharks; the common species of the Mediterranean and the Gulf of Mexico is *Pristis antiquorum*.—See TORPEDO: CEPHALOPTERA.

RAY, *rā* (or, as he himself occasionally spelt it, WRAY), JOHN: English naturalist: 1627, Nov. 29—1705, Jan. 17; b. Black-Notley, near Braintree, in Essex. After his course at Cambridge Univ. he was elected a fellow, and appointed Greek lecturer, and afterward mathematical tutor in Trinity College; but after a time turned to the study of nat. history. Accompanied by a kindred spirit, Francis Willughby, his friend and former pupil, R. travelled over most of the United Kingdom, collecting and investigating botanical and zoological specimens; and 1663, they started on a tour through the Low Countries, Germany, Italy, and France—Willughby taking the zoology under his charge and leaving R. the botany. In 1667, R. was elected a fellow of the Royal Soc., to whose *Transactions* he occasionally contributed valuable papers. After the death 1672 of his friend Willughby, with whom R. had lived since he had left the university, he was guardian to his two sons (the younger afterward raised to the peerage as Baron Middleton), and finally settled down in his native village, where he died. As a botanist and zoologist, R. ranks very high, being distinguished for assiduity, acuteness, and sagacity; and in knowledge he seems to have been far in advance of his time, as the new method of classification of plants which he proposed, though little appreciated or adopted by his contemporaries and immediate successors, was eagerly laid hold of by Jussieu and others, under whose hands it became the foundation of what is now known as the 'Natural System' of classification. R.'s zoological works are considered by Cuvier the foundation of modern zoology. In zoology, as in botany, R.'s works are remarkable for the precision and clearness of the classification which he adopts, his divisions in zoology being founded on the structure of the heart and the organs of respiration. The chief of his works on botany are *Methodus Plantarum Nova* (1682, 2d ed., revised and amended by himself), in which he details the principles of his new method of classification of plants; *Catalogus Plantarum Angliæ* (1670), basis of all the subsequent floras of England (2d. ed. 1677, 3d 1690, 4th 1696, published by himself); *Historia Plantarum* (3 vols. 1686–1704), compilation, including descriptions of all the species then known. His zoological works include *Synopsis Methodica Animalium, Quadrupedum et Serpentini Generis* (1693), and three posthumous vols. on Birds, Fishes, and Insects, published by Dr. Derham. He was author also of some theological works. His friend Willughby having collected the materials for an extensive work on the animal kingdom, left to R. the task of arranging and classifying them, and the work appeared in 3 vols., *Ornithologiæ*, in 1676, with Eng. translation by R. in the following year, and *Historia Piscium* in 1686 (2 vols.). In these were described a large number of species of birds and fishes, which had escaped the observation of previous naturalists.

RAYAH, n. *rā'yâ*. [Arab. *raiyah*, a flock—from *raya*, to pasture]: in *Turkey*, a non-Mohammedan subject who pays the capitation tax, called the Haratch.

RAYLEIGH, Lord John William Strutt, d.c.l., ll.d., f.r.s.e.: 1842, Nov. 12——————: physicist. He was graduated from Trinity College, Cambridge, 1865; honorary d.c.l., Oxford, 1883; honorary ll.d., McGill University, Montreal, Que., 1884, and Dublin University, 1885; a Cambridge commissioner under the Oxford and Cambridge Universities act, 1877; and was professor of experimental physics in the University of Cambridge from 1879 to 1884; professor of natural philosophy in the Royal Institution, 1887. He published two volumes on *The Theory of Sound* (1877–8; 2d edition, 1894), and many memoirs in the *Philosophical Transactions* of the Royal Society, and other scientific publications.. He also edited Clerk Maxwell's *Heat* (1891 and 1894). His most notable achievement was the discovery in conjunction with William Ramsay (q.v.) of a new chemical element in the atmosphere, argon (q.v.), which was made in July, 1894.

RAYMOND, *rā'mond*, Henry Jarvis, ll.d.: 1820, Jan. 24—1869, June 18; b. Lima, N. Y.: journalist. He graduated at the Univ. of Vt. 1840; began studying law in New York, but became asst. editor of the newly-established *Tribune* 1841; was connected with the *Courier and Enquirer* 1843-51; established the New York *Times* 1851; and was its editor till his death. In 1849 and 50 he was elected to the state assembly as a whig; and was speaker in his second term; 1854 was elected lieut.gov.; 1856 wrote the *Address to the People*, issued by the first national republican convention, and supported the candidacy of John C. Frémont; 1857 declined nomination for gov.; 1861 was re-elected member and speaker of the assembly; and 1863 was defeated as candidate for the U. S. senate. He gave vigorous support to Lincoln's administration, and after his election to congress (1864) sustained Johnson's reconstruction policy. In 1867 he declined the mission to Austria, and, after making a brief visit to Europe, resumed editorial labor. He was noted for ability as journalist, orator, and legislator.

RAY'MOND of Sabunde (or Sebonde, or Sabunda, or Sebeyde, etc.): scholastic philosopher: b. toward the end of the 14th c.; native probably of Barcelona, Spain. He first studied medicine, but turned to philosophy and theology, and (1430) began to lecture on theology at Toulouse. He sought to establish a parallelism between nature and revealed religion: God gave not to man two contradictory books, the book of nature and the book of divine revelation: as the Scriptures have been falsified by heretics, etc., the book of divine revelation must be read in the light of the book of nature, i.e., in the light of reason and inner and outer experience. These views are set forth in R.'s *Liber Creaturarum, sive Theologia Naturales* (Toulouse 1436, and frequently republished): the work was condemned by the Council of Trent.

RAYMOND, Rossiter Worthington, ph.d.: mining engineer: b. Cincinnati, 1840, Apr. 27; son of Robert Raikes R. He graduated at the Brooklyn Polytechnic Institute 1858; studied three years in Europe; served in the Union army 1862–64; was U. S. commissioner of mining statistics 1868–76; lectured on economic geology in Lafayette College 1870–82; was a U. S. commissioner to the Vienna exhibition 1873; and since 1867 has been an editor on the *Engineering and Mining Journal*. R. was a founder of the American Institute of Mining Engineers, and its pres. 1872–74. Among his varied publications is a *Glossary of Mining and Metallurgical Terms* (New York 1881).

RAYMOND LULLY: see Lully.

RAYNAL, *rā-nâl'*, Guillaume Thomas François: historian: 1713, Apr. 12—1793, March 6; b. St. Geniez in the ancient prov. of Guienne, France. He was educated in a Jesuit coll. at Pézénas, entered the priesthood, and afterward was deprived of his priestly office for misconduct. He then became *philosophe* and *littérateur*, contributing to the newspapers of Paris and compiling works on literature and political history. He came into prominence when he published his *Histoire Philosophique et Politique des Établissements et du Commerce des Européens dans les deux Indes* (1772, 4 vols.; revised and enlarged, ed. 1780). In compiling this work R. was assisted by several literary celebrities of France, particularly by Diderot, to whom Grimm attributed a third part of the book. This *Hist. of the Two Indies* is mainly a rather reckless attack on the Chh. of Rome, consisting of impassioned diatribes against superstition and priestcraft, often illustrated by lively anecdotes and eloquent tirades. It was translated into most of the languages of Europe. The second ed. was burnt by the common hangman 1781, and the author had to flee from France and take refuge in Prussia. After a few years he was permitted to return, and made his residence at Toulon. The other works of R. are: *Histoire du Stadhouderat* (1748); *Anecdotes Littéraires* (1750); *Mémoires de l'Europe*, 1754–74.

RAYNOUARD, *rā-nô-âr'*, François Juste Marie: French poet and philologist: 1761, Sep. 18—1836, Oct. 27; b. Brignoles, in Provence. He studied at Aix, and came to Paris to cultivate literature at the age of 23, but soon went back to the south, and joined the bar at Draguignan, where he acquired high reputation. In 1791, he was elected a member of the legislative assembly; but after the fall of the Girondins, whose opinions he shared, he was thrown into prison, and fortunately forgotten. Released from confinement after the fall of Robespierre, he resumed his profession of advocate, and in five or ten years acquired a modest competency. He then returned to Paris, and engaged anew in literary pursuits. His first poem, *Socrate au Temple d'Aglaure* (Par. 1803), was followed by the tragedies, *Éléonore de Bavière* and *Les Templiers*, the latter brought on the stage 1805

with unbounded success. Two years later R. was chosen a member of the Acad., of which he became perpetual sec. 1817. He had been made a member of the imperial legislative body 1806, and Napoleon, it is said, even meditated appointing him to the presidency, but could not be reconciled to R.'s brusque manner and fearless independence. The principal dramas which he wrote during the *régime* of Napoleon, besides those mentioned, are *Scipio*, *Les États de Blois*, *Don Carlos*, *Charles I.*, *Débora*, *Jeanne d'Arc à Orléans*. In the later days of the empire, his attention was turned to linguistic studies, particularly in the Provençal language and literature (see ROMANIC LANGUAGES). Among his writings in this department are—*Eléments de la Grammaire Romane* (Par. 1816); *Choix de Poésies Originales des Troubadours* (Par. 6 vols. 1816–21); *Lexique Roman, ou Dictionnaire de la Langue des Troubadours* (Paris 6 vols. 1838–44). R. died at Passy, near Paris.

RAZE, v. *rāz* [F. *ras*, close-shaven; *rez*, level: L. *rāsus*, scraped—from *radĕrĕ*, to scrape: Gael. *reidh*, smooth, level (see RASE)]: to lay level or even with the ground; to ruin utterly; to destroy. RA'ZING, imp. RAZED, pp. *rāzd*, overthrown; wholly ruined. RAZEE, n. *rā-zē'*, a large ship of war cut down to one of a smaller class, as a seventy-four to a frigate: V. to cut down to an inferior class, as a ship of war. RAZEE'ING, imp. RAZEED', pp. *-zēd*. RAZOR, n. *rā'zĕr* [F. *rasoir*]: a knife with a keen edge and broad back, used for shaving (see below). RA'ZORABLE, a. *-ă-bl*, in *OE.*, fit for the razor; that may be shaved. RAZOR-BILL, sea-bird, like a puffin or guillemot (see below). RAZOR-FISH, or RAZOR-SHELL, common shell-fish, having a shell long and narrow like the handle of a razor (see SOLEN). RAZOR-STROP, article for sharpening razors on; consisting usually of a piece of wood, an inch and a half broad, and 10 or 12 inches long, on each side of which is glued a piece of leather; one of the pieces of leather is usually dressed with a composition of carbonate of iron and grease, which is used first; and the sharpening is finished on the undressed leather of the other side. A leathern strop is frequently used without fixing on wood. In the W. Indies, razor-strops are commonly made of pieces of the wood of *Yucca gloriosa*, *Eriodendron anfractuosum*, *Agava vivipara*, *Ochroma lagopus*, and *Anona palustris*, all of which contain minute deposits of silica in their cellular structure, which render them very efficient for the purpose. Species of *Boletus* are so used in some other countries.—SYN. of 'raze': to prostrate; destroy; ruin; demolish; level; overthrow; subvert; efface; extirpate.

RAZE, n. *rāz* [Sp. *raiz*; L. *radix*, a root]: in *OE.*, the root of ginger.

RAZOR, *rā'zĕr*: the sharp, broad bladed knife for shaving the beard, in use from very ancient times. It is alluded to by Homer, and shaving was in favor with the Greeks and Romans (see BEARD), as a mark of civilization. Razors are almost universally metal blades, made exceedingly sharp; but an exception is in some used by savage nations—e.g., the Tahitians, who use pieces of shells and sharks' teeth, on which they grind very fine edges, sufficiently sharp to remove the beard. The Chinese and Japanese, who shave the head as well as the chin, use razors similar to the European, except that they rarely have handles; the steel of which they are made is remarkably fine.

For Amer. and European razors, the steel is chosen with great care; yet there is scarcely an article made by cutlers which is so uncertain in quality when used. Nearly 20 operations are required to produce a razor.

RA'ZOR-BILL, or RAZOR-BILLED AUK, *awk* (*Alca torda*): species of Auk (q.v.), called also Black-billed Auk, very common on the coasts of all the n. Atlantic Ocean, frequenting lofty precipices, from which its eggs are

Razor-Bill (*Alca torda*).

taken, with those of guillemots, etc., by persons let down by ropes. The eggs are esteemed a delicacy; and the flesh of the bird is much used for food. Great numbers of razor-bills are annually killed for their feathers, particularly on the coast of Labrador, where they are extremely abundant. The R. is about 17 inches long, from the extremity of the bill to that of the tail. It is very fierce, and if seized, will lay hold of the hand in return, and submit to be choked ere it will let go. The egg is about three inches long. The bird lays one or two eggs on ledges of rock or in fissures.

RAZZIA, n. *răt'sĭ-ă* [Ar. *ragazia*, a razzia]: a hostile incursion for plunder and destruction.

RE-, *rē* or *rĕ* [L. *re*, back]: a prefix, signifying 'back or again'; anew or a second time.

RE, *rā*: in *music*, the second note of the scale in ascending according to the *sol-fa* system = D.

RE, ILE DE, *ēl dĕh rā* (*Rex insula*): island about 18 m. long and 4 m. wide, on the coast of the French dept. of Charente Inférieure, opposite the city of La Rochelle, from which it is separated by the Pertuis Breton. The people mostly are engaged in fishing, and some in culture of the vine. The island is skirted by high cliffs, and strongly fortified by four forts. It has several good harbors and two light-houses; but there are neither springs nor wood on the island. Brandy made from the wines of Ré, and sea-salt, are principal articles of trade. St. Martin (pop. about 2,000), which ranks as cap. of Ré, is a well fortified little town, with a good harbor, the chief seat of trade. Oyster-farming (see OYSTER) has become an important industry. Pop. 5,600.

REABSORB, v. *rē ăb-sorb* [*re*, again, and *absorb*]: to absorb again; to draw or imbibe again what has passed off, said of fluids.

REACH, v. *rēch* (Ger. *reichen*, to extend to: AS. *raecan*, to reach: Dut. *reiken*, to reach: Low Ger. *raken*, to reach or touch: It. *recare*, to reach unto: Gr. *oregein*]: to extend, or extend to by the arm or an instrument; to stretch; to touch; to attain; to take by extending the arm; to strike from a distance, as with a weapon; to include or comprehend; to hand; to arrive at; to be extended; to fetch from and give; to bring forward from; in *OE.*, to take in the hand: N. extent; a stretching; act of touching or seizing by extending the hand; the power of extending to; power of attainment; limit of faculties; effort of mind; of a *river*, the portion in which the current flows in a straight course; in *OE.*, tendency to distant consequences; extent. REACH'ING, imp.: ADJ. in *OE.*, far-extending. REACHED, pp *rēcht*. REACH'LESS, a. inaccessible.—SYN. of 'reach, v.': to extend; stretch; thrust out; penetrate to; arrive at; come to; gain; attain; obtain; transfer.

REACH, v. *rēch*, REACH'ING: other spellings of RETCH and RETCHING: see RETCH.

REACT, v. *rē-ăkt'* [L. *re*, back; *actus*, done or acted—from *ago*, I do]: to resist by an opposite force; to resist any influence or power; in *chem.*, to act mutually on each other, as two reagents. REACTION, n. *rē ăk'shŭn*, the resistance made by a body to the action or impulse of another body; an action or force arising in opposition to another which has preceded: in *medicine* and *surgery*, process of recovery from a state of collapse (see SHOCK): in *polit. history* (see below). REAC'TIVE, a. *-tĭv*, having power to react; able or tending to react. REAC'TIONARY, a. *-shŭn-ĕr-ĭ*, implying reaction: in *politics* and *history*, applied to certain stages in the progress of events, when, after a decided movement in one direction, e.g., toward democracy — the movement either remains stationary, or contrary sentiments begin to prevail: see REACTION (below).

REACTION: term in political history, denoting that tendency, often showing itself, to recoil from the effects of reform or revolution, and to seek a restoration of the previous state of things, or even of one more antiquated and abusive. The causes of R. are various: often what are deemed causes are mere occasions of the operation of a deeper cause, which deeper cause may be traced to popular fickleness—love of change after change, each alike reasonless. Undeniably, however, one great cause of R. is the natural periodicity of human sentiments and feelings, which tend never to abide long in one mood, but to return like the tide after its ebb. While this law of periodicity has its rightful use and function, its operation should be duly controlled by the higher laws of morality and reason; but to this necessity the mass of men give little heed, and thus are always ready for reaction. Only the select few can be fully trusted to stand to a high moral principle which had been chosen on good grounds and set in action, when the first enthusiasm wanes, and the popular tide begins—as it almost surely will—to set against it. Sometimes R. springs, partly at least, from mere disappointment at the smallness of the *visible* results of those changes advocated with so much eloquence, and waited for with such enthusiastic hope. The inconsiderate imagination of the people expects universal prosperity to follow every important change; and when, after the event, men find themselves still in the old world of imperfections, hardships, and sorrows, they are prone to believe that they have been deluded, and are ready to give ear to the insidious misrepresentations of those opposed to all progress. But more frequently political R. springs from immature, or injudicious, or extravagant revolution. The times are not yet ripe (as in the first Italian revolts), or the leaders are unfit (as in the German and Hungarian struggles of 1848–9), or frightful excesses are committed (as in the great French outbreak of 1789); and so a revolution is nipped in the bud, or overthrown on the battlefield; or, inflamed with sanguinary thirst of revenge, it goes mad in a 'reign of terror,' and exhausting itself in unprofitable frenzies, falls at last an easy prey to any bold and unscrupulous adventurer whom the crowd may elect in their desperation and their disgust of anarchy, and whose rule is as absolute and as outrageous as any that preceded it. A R. may thus, in certain cases, be useful or even indispensable, so far as it rebukes fanaticism, and teaches reformers and revolutionists the point beyond which nature forbids them to go; but its agents are frequently low in intellectual type, base in character, odious in their principles, and selfish in their projects: conspicuous exceptions, however, exist, and should be carefully considered. Religious reactions exhibit the same characteristics as political ones, and proceed from the same causes.

READ, v. *rēd* [AS. *rædan*, to advise, to interpret: Icel. *ræda*, to consult; *ræda*, discourse: Ger. *reden*, to talk]: to pronounce or give utterance to that which the written symbols placed before the eyes are meant to convey; to peruse, as a book, either silently or aloud; to discover by looks or marks, as regards thought or character; to study, as a student; to perform the act of reading; to be studious; to know by reading or observation; to know fully. READ'ING, imp.: ADJ. addicted to reading: N. act of reading; perusal; study of books; public recital; lecture (see READING AND SPEAKING): a given word or passage as it reads in a particular MS. or printed book; a version or interpretation of a particular passage in a book, as conveying the true meaning of its author; the formal recital of a bill before a legislature, as *first reading*. READ, pp. *rēd*. READER, n. *rēd'ėr*, one who reads; a corrector of the press; one whose office is to read prayers in a church; a lecturer before a university. READ'ERSHIP, n. the office of a reader. READ'ABLE, a. *-ă-bl*, that may be read; legible. READ'ABLY, ad. *-blī*. READ'ABLENESS, n. *-bl-nĕs*. WELL-READ, a. *-rĕd*, versed in books; learned. READING-BOOK, book containing selections to be used as exercises in reading. READING-DESK, desk at which the church service is said. READING IN, the legal taking possession of a benefice in the Anglican Church by reading the Thirty-nine Articles in church before the congregation. READING-ROOM, apartment furnished with newspapers, etc., where persons are admitted to read.

READ, GEORGE: 1733, Sep. 16–1798, Sep. 21; b. Cecil co., Md. At the age of 19 he commenced law practice at Philadelphia; afterward removed to Del. and became atty.gen. for three counties; served in the Del. assembly 12 years; was a member of the first congress, Philadelphia 1774; signed the Declaration of Independence; drafted the first constitution of Del.; was a member of the national constitutional convention; a member of the U. S. senate 1789–93, resigning in the latter year to become chief-justice of the state, which office he held till his death, at Newcastle.

READ, *rēd*, GEORGE CAMPBELL: naval officer: about 1787–1862, Aug. 22; b. Ireland. He entered the U. S. navy as midshipman 1804. As lieut. he gained distinction in the war of 1812, and toward its close commanded the *Chippewa*, brig, in Com. Perry's flying squadron of commerce-destroyers. R. was commissioned commander 1816, capt. 1825; he was in command of the E. India squadron 1840, of the squadron on the African coast 1846, then of the Mediterranean squadron. R. was placed on the reserve list 1855, and 1862 was retired as rear-admiral.

READ, JOHN MEREDITH, LL.D.: jurist: 1797, July 21—1874, Nov. 29; b. Philadelphia. His grandfather, George R., was one of the signers of the Declaration of Independence, and his maternal grandfather, Samuel Meredith, first treasurer of the United States. He graduated at the Univ. of Penn. 1812, and 1818 was admitted to the bar. From 1823 he served for several terms as a member of the lower house of the Penn. legislature, as U. S. dist. atty. for the e. dist. of Penn. 1833–41, and as atty.-gen. of the state for a few months in 1846, when he resigned the office. In 1845 he was nominated a judge of the supreme court of the United States, but for political reasons the senate refused to confirm the nomination. In 1858 he was elected judge of the supreme court of Penn., and was its chief-justice from 1860 until his death. The degree of LL.D. was conferred on him by Brown Univ. He died at Philadelphia.

READ, JOHN MEREDITH, Jr.: diplomatist: b. Philadelphia, 1837, Feb. 21; son of John Meredith R. He graduated at Brown Univ. 1858, at the Albany Law School 1859, and afterward studied international law in Europe. R. was appointed consul-gen. at Paris 1869, and was acting consul-gen. in Germany during the Franco-Prussian war. In 1873 he was appointed U. S. minister to Greece, holding the position until it was abolished 1879. He is author of *A Historical Inquiry concerning Hendrik Hudson*, and wrote much for periodical literature. He d. 1896, Dec. 27.

READ, NATHAN: inventor: 1759, July 2—1849 Jan. 20; b. Warren, Mass. After graduating at Harvard Coll. 1781, he was 4 yrs. tutor there; then studied medicine; afterward began a series of practical experiments with a view to improve the steam-engine as a means of propelling boats and carriages. For the great working-beam he substituted the cross-head running in guides and having a connecting-rod to communicate the motion: the cylinder was double-acting. He made the boiler multitubular, containing the furnace within itself; and established at Salem, Mass., an iron foundry for construction of such apparatus. As a means of propelling boats he first employed paddles, then a chain-wheel. He designed also a steam-carriage. He obtained a patent for a machine for cutting and heading nails at one operation 1798. Other of his inventions were: a method of equalizing the power developed in windmills; of utilizing the force of the tide; forms of pumping engines and threshing machines, etc. He was representative in congress 1801–03; was appointed judge of the court of common pleas 1807; but removed about that time to near Belfast, Me. He was the first petitioner for a U. S. patent, before the law of patents was enacted. See *Nathan Read: His Invention of the Multitubular Boiler*, etc., by his nephew of the same name.

READ, THOMAS BUCHANAN: poet and painter: 1822, Mar. 12—1872, May 11: b. Chester co., Penn. At the age of 15 yrs. he left his home and wandered to Cincinnati, where he showed some talent for portrait painting, and opened a studio; but he soon became a wanderer, going from village to village, painting portraits and sign-boards, and giving public entertainments. He returned to the east 1841, living in New York, Boston, and Philadelphia in succession till 1850, when he spent a year in Europe. Again he visited Europe, studying art in Florence and Rome 1853–58; and then till his death in New York made his residence in Rome. His poems are marked by patriotic sentiment and by considerable artistic power. His first vol. of poetry was pub. at Philadelphia 1847. Of all his poems *Sheridan's Ride* is the most widely known. His complete *Poetical Works* were printed at Philadelphia 1867 (3 vols.). Most of R.'s paintings deal with mythic and allegorical subjects, strongly and poetically conceived, but treated with defective *technique*. *Sheridan's Ride* and *Undine* are among the best known.

READE, *rēd*, CHARLES, D.C.L.: English novelist and playwright 1814—1884, Apr. 11; youngest son of a famous Oxfordshire squire, John R., of Ipsden House. From a private tutor he passed to Magdalen College, Oxford, as a demy or scholar, and, taking a third class in classics (1835), obtained a close fellowship. In 1843, he was called to the bar as a member of Lincoln's Inn; but it soon became obvious that his chosen career was in literature. The book by which he first became known as a writer of distinct mark and promise were *Peg Woffington* (1852), and *Christie Johnstone* (1853), both full of talent, though as yet somewhat crude and immature. In 1856 he fairly established his reputation in *Never too Late to Mend*, first of a series of novels each illustrating some social or public evil. Among his subsequent works are: *The Course of True Love* (1857), remarkable for rare nicety and subtlety in delineation of its leading female character; *White Lies* (1858,); *The Cloister and the Hearth* (1861), his masterpiece; *Hard Cash* (1863); *Griffith Gaunt* (1866); *Put Yourself in His Place* (1870); *A Terrible Temptation* (1871); *A Simpleton* (1872); *A Woman Hater* (1877); and *Readiana* (1882). Of his dramas, the most general favorite is *Masks and Faces*. R. is by common consent a writer of marked ability. He has much of the true talent of the *raconteur*, with considerable dramatic instinct, and is unrivalled in the abundance of his incident; and from all his later novels, a sense of general intellectual vigor is strongly borne in upon the reader; while a certain wayward crotchetiness and odd aggressive eccentricity from time to time cropping out, serve rather to give his writing some relish and sting of individuality, than seriously to mar its effect. His work had always shown, beneath its lightest forms, a serious and truthful aim; and in his last years this element in his character developed itself into definite religious convictions and a clear Christian faith.

READILY, READINESS, etc.: see under READY.

READING, *rĕd'ing:* city, cap. of Berks co., Penn., on the Schuylkill river, and on the Philadelphia and Reading, the Pennsylvania, and the Wilmington and Northern railroads; 55 m. e. by n. of Harrisburg, 58 m. n.w. of Philadelphia, 128 m. w. of New York. It is on the e. bank of the river, whence the surface gradually rises to Penn's Mountains on the e. and Neversink Mountains on the s.; is handsomely laid out with broad regular streets; is lighted by gas and electricity; and has excellent water, sewerage, steam-heating, and fire plants. There are 61 churches, 2 public high schools, 17 grammar schools, 53 secondary schools, 53 principal primary schools, 83 assistant primary schools, 35 public school buildings, 2 libraries, public and law, 6 cemeteries, 7 national banks (cap. $1,450,000), 2 state banks (cap. $225,000), and 6 daily, 11 weekly, and 6 monthly periodicals. The city is noted for its shipping and manufacturing interests. The latter was represented 1890 by 435 reporting establishments, which had a direct investment of $14,083,374; employed 12,966 hands; paid $5,461,293 for wages, $12,009,332 for materials, and $1,042,366 for miscellaneous expenses; and had a combined output valued at $20,855,165. The principal industry was the manufacture of iron and steel, the output of which was valued at $2,785,155. Fifteen foundries and machine shops had total output of $1,769,949. Besides other industrial plants it has the principal shops of the Philadelphia and Reading railroad. The city had an assessed property valuation 1894 of $42,000,000, and owned the waterworks ($1,250,000), real estate ($225,000), and other property ($101,194) of total value $1,576,194. The tax rate was $12.50 per $1,000. In 1895, the water debt was $615,000, and the net city debt, $1,035,000.—R. was founded 1748, created a borough 1783, chartered a city 1847. Pop. (1880) 43,278; (1890) 58,661; (1896) estimated, 81,000.

READING, *rĕd'ing:* flourishing municipal and parliamentary borough of England, cap. of Berkshire; on the left bank of the Kennet, 1½ m. above the junction of that river with the Thames, 36 m. w. of London by the Great Western railway. It is irregular in plan, though recently improved in this respect. The tongue of land immediately above the confluence of the rivers is the chief business part of the town. The church of St. Lawrence, with a tall flint tower, still shows traces of its original Norman character; and the Benedictine Abbey, now a mere shell, was founded 1121, and was at one time the third in size and wealth in the country. Of the numerous educational establishments, the free grammar-school (1486) was rebuilt 1870–1. R. is an important mart for corn and other agricultural produce, carries on iron-founding, brewing, etc., and is best known for an extensive seed-emporium and a large biscuit factory. Pop. (1871) 32,324; (1881) 42,050; (1891) 55,752.

READING AND SPEAKING: the first, delivery of language as written or printed; the second, utterance of spontaneous composition. Reading is merely mechanical when words are intelligibly but unimpressively delivered; and it is oratorical in effect when the sentiment proper to the utterance is expressed by pauses, tones, emphasis, etc. Recitation from memory is another form of reading, the matter being delivered from a mental transcript. This mode is highly favorable to oratorical effect, but it is limited in application, and untrustworthy where exactness of phraseology is important. Speaking from spontaneous composition is the highest form for oratory. The qualities requisite for these arts are very different.

To read well involves perfect understanding of the construction of sentences, and ability to analyze complex forms of composition, and discriminate between essential and expletive words; it involves also a nice perception of the qualities of modulation, and their relation to expressiveness, together with ability to regulate the voice so as exactly to suit the sound to the sense. The study of the art of reading is thus valuable as a means of improvement in composition, as well as for its influence in refining the taste, and exercising all the faculties of perception, expression, and adaptation.

In good reading, the thoughts of the writer must first be taken into the reader's mind, and then delivered as the writer himself might have uttered them immediately on their conception. Children, when set to read language above their comprehension, are of necessity merely mechanical readers; and in this way they acquire habits of unintelligent reading, seldom perfectly thrown off in after-life. In silent reading, or the perusal of language for our own information, we gather the sense as we proceed, and correct misapprehensions by reflection; in reading aloud for information of others, we must perfectly comprehend the matter before we utter it, so as to avoid misleading the hearer. A practiced reader can, no doubt, exercise sufficient prevision at the time of reading, by keeping his eye in advance of his utterance, to read any ordinary composition fairly at first sight; but for public reading this would be insufficient. Whatever is to be read in public should first be well studied in private. The reader thus knowing definitely what he has to express, will give forth no uncertain sounds, and his manner will have the freedom of memoriter delivery, without the disadvantage of its constraint on the mind. His whole attention will be concentrated on the object of his reading, the effective *conveyance* of the matter and spirit of the composition. The presence of the book before him will be necessary chiefly to give confidence, and prevent the possibility of rambling. The trained eye, assisted by memory, will take in clauses and even sentences at a glance, so that it may be freely raised during utterance. If the eye of a reader is fixed on the book, he seems to be perusing it for his own

information; but if he look his hearers in the face, as, with due preparation, he should be able to do, his delivery may have all the qualities of spontaneous oratory, and be to the hearers speaking rather than reading. This effectiveness is rarely exemplified, because the requirements for public reading are so little understood, and so habitually neglected in our systems of education. The tameness, monotony, and rhythmical singsong so generally associated with reading, have created a prejudice against the use of 'paper' in pulpit addresses; in consequence of which, in some churches, the practice of reading sermons is discountenanced, while in others it is positively interdicted. Many congregations, however, fearful of the mistakes, repetitions, and rambling thought of the untrained extemporizing preacher, demand carefully written discourses. The quality of sermons, as compositions, is indeed seriously impaired when extemporized by one who lacks the natural gift or the due training for spontaneous utterance; but the cure for bad reading—against which the prejudice is directed—is *good* reading. All men cannot be orators, but all may be taught to read orotorically; and were students systematically trained in this art, the services of the church would be far more attractive and influential. In lack of this training, very many preachers are ineffective as public speakers; and discourses prepared to be delivered from memory are—with some brilliant exceptions—among the meaner species of literary compositions.

The chief points of difference between ordinary reading and utterance of spontaneous composition, are the uniform force and time and continuative tones of the former, as contrasted with the reflective breaks and varying modulations and emphases of the latter. The speaker feels what he wishes to say, and he conveys with definiteness the felt relation of each word to the idea dominant in his mind. Expletive and explanatory phrases are given parenthetically; ellipses, interpolations between grammatically related words, similes, quotations, and all other elements of rhetorical style, are indicated by changes of modulation; and the *point* of every sentence is made unmistakably apparent. On the other hand, the reader sees all the parts of a sentence level to his eye, and he is apt to deliver them with a corresponding indiscriminativeness of manner; either without variety of time, tone, and stress, or with mere alternation of force and feebleness, or the equal indefiniteness of emphasis on every phrase.

In all good reading and speaking, it is presupposed that one has learned to breathe. By this is meant the keeping of the lungs fully supplied with air, the abundant supply that gives ease and power of vocalization. Otherwise the vocal machine plays poorly, continually runs down, and needs a gasping effort to renew its action. Watch the back of many an educated person engaged in reading or speaking, if your position enables

you to do so, and by noting the swell and collapse of his clothing between the shoulder-blades, you can readily see whether, with all his acquirements, he has ever learned to breathe. There should be no collapse whatever. Many persons go on with a sentence without frequent inspirations even to the end of a long clause; the inevitable result is monotony and decreasing force, and downhill inflections, giving no chance for expression—least of all the cumulative effect and terminal climax which belong to a well-constructed sentence. To breathe, the chest must be well arched out, the attitude erect, and, if standing, the position must be well balanced and firm; all this gives, also, a corresponding energetic command of mind and utterance. Still more necessary is it to make many natural groupings of the words read or spoken, and thus allow *frequent imperceptible inhalings*, so as to keep the lungs full; this may be by purposed practice at first, but becomes soon an unconscious habit, somewhat like the art of continuous inbreathing in the use of the blow-pipe, even while the cheeks are puffed out with strong constant expiration. As to the grouping of words (each sub-group, even, permitting a gentle inspiration), take a sentence, the upright lines here indicating a possible breathing-place: 'When, | in the course | of human events, | it becomes necessary | for one people | to dissolve | the political bands | that connect them with another, | etc. The inbreathing may be very slight, but, if frequent, it keeps the lungs full. Moreover, the grouping should be made for grammatical clearness, and much, if not all of it, for rhetorical effect, which is helped by many slight, and some special, rhetorical pauses. Perfect practice will combine an easy flow of words with these physiological and rhetorical essentials.

The study of such manuals as Russell's unexcelled *Vocal Culture*, though sometimes ridiculed, is as necessary as the study of the principles of music, drawing, or painting, though a knowledge of principles will not, alone, make an artist or a reader. Constant practice and the copying for practice of good models are almost indispensable. One successful pulpit speaker said that, with all his previous study and practice, it was only by hearing Fanny Kemble read Shakespeare, and then, the same evening, endeavoring to read the same play with like effect, that he broke up a monotony of which he had been for several years painfully conscious. The masters in every art must be emulated, if not imitated.

Physiology aside, the first mental requisite for effective reading is a clear conception of the author's intention, together with such mastery of the voice as may enable the reader to express that one meaning to the exclusion of all other possible meanings. For every cluster of words is like a many-sided crystal, which may be made to throw light from any of its facets, according as one or another of them is presented uppermost. The most prominent word in the utterance of a sentence is not

necessarily the most important grammatical word, but that which is new in reference to the context; and such words as are already before the mind—whether directly stated, inferentially included in former expressions, or otherwise implied—are pronounced with subordinateness of manner. Thus, in the following lines:

> The quality of mercy is not strained,
> It droppeth as the gentle rain from heaven
> Upon the place beneath. It is twice blessed:
> It blesseth him that gives and him that takes.

As to 'drop' is the natural characteristic of 'rain,' and as rain always falls 'from heaven,' and necessarily 'upon the place beneath,' these implied words will be pronounced subordinately; thus:

> It droppeth as the *gentle rain* from heaven
> Upon the place beneath.

Bearing in mind, further, that mercy is of necessity 'blessed,' the reader will proceed:

> It is *twice* blessed;

and as the object of the speech is to *solicit* mercy, he will give prominence to the word that advances the suit. Thus:

> It blesseth him that *gives*, and him that takes.

On this principle, the reader shows that he has, in his own mind, performed the writer's process of thought, and so made the language which he interprets virtually his own. But, to express with definiteness the thoughts and sentiments thus adopted, the reader must have the *instrument* of expressiveness perfectly under control. His voice should have no more predisposition to any particular tune than the flute or violin of a musician. Tones have an inherent value, above and independent of language, so that assertive construction may be made to convey interrogative meaning, and interrogative language may have assertive or imperative force. The modulations of the voice unravel all the complexities of composition, separating words from their immediate context, or connecting them with others from which they are most widely separated in the sentence. Thus, in the following lines:

> Slowly and sadly we laid him down,
> From the field of his fame fresh and gory,

the clause 'fresh and gory,' is by relative modulation, shown to refer to 'him' in the preceding line, and not to the nearer words 'fame' or 'field.' So, in the following passage: 'And they came with haste, and found Joseph and Mary, and the babe lying in a manger.' Here the series, 'Joseph and Mary | and the babe' is divided by a modulation of the voice, so as to show that the last word 'babe' is alone the grammatical antecedent to the clause 'lying in a manger.' From such illustrations it is obvious that good reading involves close

thinking, and that the governing qualities of tone demand accurate appreciation and careful culture.

The tones of the speaking voice all are more or less *inflected*, in which respect they differ essentially from singing tones, which are level, and varied only in pitch. The term 'modulation,' as understood by elocutionists, has reference to the general pitch of the vocal inflections in a passage. The inflections themselves all are either rising or falling. The rising turn of voice carries on the hearer's attention to what is to *follow*—the falling turn directs attention to what has gone *before*; the former asks or appeals to the hearer—the latter affirms or enjoins from the speaker; the former is negative—the latter is positive. Simple inflections rise or fall directly from their accentual pitch to their termination, and the range of the inflection may have any extent, from less than a semitone to more than an octave. The strongest rising tones are expressive of interrogation, incredulity, or entreaty; and the strongest falling tones of affirmation, assurance, or command. Compound inflections unite the two vocal movements—falling before a rising termination, and rising before a falling termination—with one accentual impulse; and the effect of this opposition of tone is to add to the expressiveness of the termination a suggestion or *inference* in accordance with the expressiveness of the commencing turn. Thus: 'Not ŏne,' with compound rising tone, implies 'but more.' 'Even ône,' with compound falling tone, implies 'and not more.'

The emphatic force of tones depends on their accentual pitch in relation to that of preceding tones, as well as on the extent and the direction of the inflection. The amount of possible variety in these degrees is exceedingly great, but the peculiar expressiveness of individual modes of inflection is definite, traceable to systematic principles, and of limited extent, depending principally on three qualities—

1. Rising or falling accent as well as termination; as
   Cónstánt, Cònstànt.
2. Rising or falling accent with opposite termination; as
   Cŏnstánt, Cònstànt.
3. Accent higher or lower than preceding pitch; as
   dïe? To To drêam.
   To slèep. sléep? Perchance to

These three sources of vocal variety the student of elocution should have under ready and perfect control.

Two of the greatest vices of utterance are false emphasis and excessive emphasis. An example of the former was the reading of a long chapter in a religious service, repeating 'And *he* said unto them,' 'And *they* said unto him;' the pronouns require no emphasis. In general it is the pronouns, prepositions, auxiliary verbs (is, was, may, can, etc.), and other small parts of speech,

which are magnified by over-smart blundering. An excessive amount and stress of emphasis is a frequent fault; it overshoots its mark and destroys the very effect sought, like too many high lights in a picture. It should be remembered that emphasis by stress ought to be distributed in many gradations, like the lights in a painting; also that stress is not the only means of emphasis, for pitch, accent, prolongation of sound, even low notes and whispering quality, are but other forms of it; in short, whatever calls attention to a word or clause is emphasis.

The art of elocution has received comparatively little attention in modern times, till within recent years. The value of a good delivery is certainly not less now than it was among the orators of ancient Greece and Rome; but the assiduity with which the art was cultivated by the latter, and the estimation in which it was held by them, present strong contrast to the negligence and apathy of modern speakers in regard to delivery. This fact is not easily accounted for; the influence of elocution being such, that an inferior address well delivered never fails to create a stronger impression on an audience than the most masterly composition that lacks the graces and enforcements of effective utterance and action.

Much suggestion for effective reading is found in the ordinary style of animated conversation. To be natural is to follow those laws or principles which undoubtedly are to be deduced from the operations of the voice in spontaneous speaking. Elocution, therefore, is none the less 'natural,' that it must be studied as an art; and the study of this art is not justly to be contemned.

To acquire a natural style of reading, the chief point to be attended to is the logical clausing of sentences, so as to present, with separate completeness to the hearer's mind, every fact and every associated circumstance, whether principal or subordinate. Punctuation is not a sufficient guide for this purpose; it will sometimes even mislead. Thus, in the following sentence from Macaulay's *Essay on Milton:* 'Even when a system has been formed, there is still something to add, to alter, or to reject'—the logic of the sentence is not brought out by the punctuation. The reader should make a modulative break after the word 'something,' where no comma is placed, and he should, notwithstanding the separating commas, unite the three subsequent clauses by a modulative tie, to show their expletive nature, and the equal relation of each of them to their common antecedent. Thus: 'There is still *something* | to add, to alter, or to reject.'

In the following sentence from the same Essay, no comma occurs, but the reader will nevertheless divide the period into at least three modulative clauses: 'The blaze of truth and liberty | may at first dazzle and bewilder | nations which have become half blind in the house of bondage.' Here the first section contains the

subject of the sentence, the second the *predicate*, and the third the *object*, with its dependent clauses. It is to be observed that the object 'nations' is separated from its governing verb 'bewilder,' only because 'nations' is itself the governing antecedent to a new but subordinate sentence.

These illustrations are sufficient to show that the clausing of sentences for effective reading is dependent on a different principle from that which regulates punctuation.

Nor is any particular mode of vocal inflection necessarily associated with any of the marks of punctuation. This is to be noted particularly in connection with the sign of interrogation. The position of this mark, too, at the end of a period often misleads readers into an unnatural tone. The interrogative part of the sentence may not extend beyond a single clause, and this may be followed by many clauses within the same period. The mark of interrogation would therefore be better placed at the beginning of a sentence. But, as above shown, interrogative language may sometimes require for its just expression any one of all the tones in the gamut of speech. Thus: 'Will you?' If pronounced with a simple rising tone, this question asks or appeals; and with an extended range of inflection, it expresses doubt or surprise. But the form of words does not necessitate the rising tone. Thus: 'Will you?' If pronounced with a simple falling turn, the question expresses desire or expectation on the part of the speaker; and with an extended range of inflection, it conveys more or less of authoritative injunction.

The same question may legitimately, also, take either of the compound forms of inflection. Thus: 'Will you?' If pronounced with a compound rising turn, it infers some cause of opposition or hindrance; and with an extended range of inflection, insinuates more or less of threatening or penalty. With a compound falling tone, thus: 'Will you?' it suggests more or less of defiance and contempt, according to the pitch of the commencing turn, and the extent of the concluding inflection.

Extemporaneous speaking is greatly assisted by a good habit of elocution, and it is at the same time strongly conducive to the formation of such a habit. The deliberate utterance which weighs every phrase, gives the mind time to revolve its ideas, and choose the most effective words for their expression; and the evolution of a continuous train of thinking in coherent sentences compels deliberation and guarded delivery.

Speaking from memory admits of the application of every possible element of effectiveness, rhetorical and elocutionary; and in the delivery of a few great actors, the highest excellence in this art has been exemplified. But speaking from memory requires the most minute and careful study, as well as high elocutionary ability, to guard the speaker against a merely mechanical fluency and thoughtlessly rhythmical utterance.

READJOURN, v. *rē′ăd-jėrn′* [*re*, back or again, and *adjourn*] : to adjourn a second time.

READJUST, v. *rē′ăd-jŭst′* [*re*, back or again, and *adjust*] : to put in order again what had been disarranged. RE′ADJUST′MENT, n. a second adjustment.

READJUST′ERS : see REPUDIATION.

READMISSION, n. *rē′ăd-mĭsh′ŭn* [*re*, back or again, and *admission*] : state of being admitted again; the act of admitting again; also RE′ADMIT′TANCE, n. *-mĭt′tăns.* RE′ADMIT′, v. *-mĭt′*, to admit again.

READOPT, v. *rē′ă-dŏpt′* [*re*, back or again, and *adopt*] : to adopt again.

READORN, v. *rē′ă-dawrn′* [*re*, back or again, and *adorn*] : to decorate a second time.

READY, a. *rĕd′i* [AS. *ræde;* Low Ger. *reed;* Dut. *gereed;* Ger. *bereit;* Dan. *rede*, ready : Sw. *reda;* Scot. *red*, to arrange] : prepared; quick; prompt; not embarrassed; furnished with what is necessary; arranged; set in order; not hesitating; willing; disposed; being at the point; not distant; easy; expeditious; expert; skilful; not dull in intellect; in hand, as a weapon or money; next to hand; in *OE.*, dressed : AD. in such a state of preparation as to need no delay. READ′ILY, ad. *-i-li.* READ′INESS, n. *-nĕs*, quickness; freedom from reluctance; promptitude; willingness; fitness of condition; being in a state of preparation. TO MAKE READY, to prepare; to put in order. READY-MADE, a. made beforehand; kept on hand for sale or use; not made to order. READY MONEY, n. cash; means of immediate payment; not credit. READY RECKONER, n. a book of tables and figures giving the calculated prices of articles in any number from a farthing each in value upward. READY-WIT′TED, a. having ready wit.—SYN. of 'ready, a.': prompt; prepared; willing; eager; quick; near; easy; facile; opportune; expedite; nimble; unembarrassed; expeditious; speedy; unhesitating; dexterous; apt; skilful; handy; expert; fitted; disposed; cheerful; free; —of 'readiness': promptitute; aptitude; skill; knack; dexterity; ease.

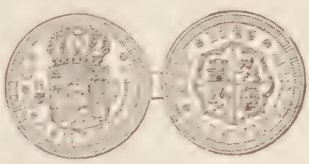
REAFFIRM, v. *rē′ăf-fėrm′* [*re*, back or again, and *affirm*] : to affirm a second time.

REAGENT, n. *rē-ā′jĕnt* [*re*, back or again, and *agent*] : in *chem.*, a substance used to detect the presence of other bodies in compounds; a test.

REAGGRAVATION, n. *rē-ăg′gră-vā′shŭn* [*re*, back or again, and *aggravation*] : in the *eccles. law* of the *Rom. Cath. Chh.*, the last monitory or warning, published after three admonitions, and before the last excommunication.

REAL, a. *rē'al* [Sp. *real*, actual: F. *réel*, real—from mid. L. *rēālis*, real—from L. *res*, a thing]: not fictitious or imaginary; true; genuine; permanent or immovable, as *real estate*—that is, lands and tenements. REALLY, ad. *-li*, with actual existence; not seemingly so; in truth. REALITY, n. *rē-al'i-ti*, actual being or existence of anything; fact; truth; not a mere appearance or show. REALTY, n. *rē'al-ti*, in *law*, real property (see REAL ESTATE). REAL ACTION, an action at law in regard to lands or tenements. REAL ESTATE, lands, and all that appertains to them (see below).—SYN. of 'real': actual; genuine; true; authentic; veritable; certain.

REAL, n. *rē'ăl* [Sp. *real*—from L. *rēgālis*, royal; *rex* or *rēgem*, a king]: a silver coin and money of account in Spain, Mexico, and other old Spanish possessions. It is the $\frac{1}{20}$ part of the piastre (*peso duro*), or $\frac{1}{4}$ of the *peseta*, the franc of the new Spanish decimal system; and has a value, varying with the exchange, of about 5 cents. Of the old Spanish reals now disused, the *real de plata* was the $\frac{1}{8}$ of the piastre or *peso duro* (see PIASTRE); and the copper-real, or *real de vellon*, was the $\frac{1}{10}$ part of the piastre. The real was first coined in



Spanish Silver Real. One-twelfth less than original.

Spain 1497, and has frequently varied in value. At the present day, in Mexico, Peru, and the Central American republics, the piastre is divided into 8 reals, and silver coins of one real are current; while in Colombia, it is divided into 10 reals, and silver reals and half-reals are coined. The real is also a money of account in Portugal, being the equivalent of 40 reis; and in Batavia, it is the name of a weight for gold and silver articles corresponding to 17 dwts. 14 grains troy weight.

RE'AL ESTATE, or RE'ALTY, in Law: one of the great subdivisions of all property, generally including land and houses, as distinguished from goods, chattels, and money, which are included in the class of property known as personal property, or personalty; the first division including such property as is fixed and immovable; the other, all movables. By the statutes of nearly all the states, real property is defined to include land, tenements, and hereditaments, and all rights thereto and interests therein; land comprehends all things of a permanent substantial nature; tenement is a word of greater extent, and though by the layman applied only

to houses and buildings, yet in its legal sense signifies anything that may be holden, providing it be of permanent nature, no matter whether of a substantial or unsubstantial kind; hereditament is the most comprehensive expression of the three, and includes not only lands and tenements, but whatever may be inherited, whether corporeal or incorporeal, corporeal comprising such things as affect the senses and may be seen or handled, incorporeal including such things as are not objects of sensation, being creations of the mind and existing only in the mental apprehension. R. E. includes, in many of the states, estates for years, though in some of the states not including leases unless they exceed three years; estates for the life of another; pews and rights in churches; mining rights; growing trees or growing crops or grass. Trees cut and lying on the land or blown down by the wind will pass with a conveyance of the land. *Real* chattels or chattels *real* are such as concern or affect realty, such as leases, mortgages, and contracts affecting real estate. They are called chattels real because they are interests issuing out of or annexed to R. E.; they differ from realty in lacking a sufficient legal, indeterminate duration; the utmost period for which they can endure is fixed either for a space of time certain or until a certain sum of money can be raised out of a particular fund or income. There are certain articles, as structures called 'fixtures,' which in themselves are personal property, but which have been annexed to or have become accessory to R. E.: whether such a 'fixture' has become R. E. depends on the nature of the annexation, the intention with which it was made, and the parties interested in such property between whom the question is likely to arise; e.g., landlord and tenant, mortgagor and mortgagee, heirs and executors, vendor and vendee. There formerly existed a division of actions or suits at law into real actions and personal actions; in the United States, however, real actions, except action of ejectment, have either been abolished or have fallen into disuse; ejectment, in some states called 'Writ of Entry,' and in others 'Action to Recover Real Property,' has become the ordinary remedy to try the title to land; the procedure in this action has been much simplified and improved as compared with the former practice. There were also actions called mixed actions, which partook of the nature of both real and personal actions; in the United States these actions likewise have been abolished or have fallen into disuse. In the event of death of the owner of property, the division into realty and personalty becomes important; on that event the real property passes immediately to the heirs of the decedent, and the personalty goes to his executors if he left a will, or to his administrators if he died intestate. Personal property is used first to pay the debts of the decedent, and if there is a balance it is used to pay legacies in the case of a will, or in the case of

intestacy is given to the next of kin of the decedent in the order provided for by the Statute of Distribution. Recourse to real property for the payment of debts can be had only in case there is not sufficient personal property for that purpose. The succession of real property is governed in most of the states by a statute called the 'Statute of Descent.' See SUCCESSION.

REALGAR, n. *rē-al'gar* [F. *réalgar*—from Sp. *rejalgar*, name used by the alchemists—said to be from Ar. *reâlj al-ghār*, cavern-dust, arsenic]: mineral consisting of about 70 parts of arsenic and 30 of sulphur. This native sulphuret of arsenic is of very brilliant scarlet color, generally translucent, sometimes transparent; and occurs in the vicinity of volcanoes, and in many igneous rocks; massive, disseminated, or crystallized. Its crystals are prisms, sometimes needle-like. It yields to the pressure of the nail. A similar substance, prepared artistically and used as a pigment, is known also as *red orpiment* and *red sulphide of arsenic*.

REALITY, REALTY: see under REAL 1.

REALIZE, v. *rē'ăl-īz* [It. *realizzare*; F. *réaliser*; Sp. *realizar*, to realize—from mid. L. *rēālis*, real (see REAL 1)]: to bring into being or act; to convert money into lands or tenements; to convert property of any kind into money; to consider or treat as real; to feel as a reality; to come up to, as one's expectations. RE'ALIZING, imp. RE'ALIZED, pp. *-īzd*. RE'ALIZ'ABLE, a. *-īz'ă-bl*, that may be realized. REALIZATION, n. *rē'ăl-ī-zā'shŭn*, the act of realizing; the act of making or believing as real; the act of bringing into being or act. RE'ALIST, n. *-ist*, one who portrays nature or real life as he finds it: in the *old scholastic phil.*, one who holds the Platonic doctrine that, irrespective of individual existences, universal ideas—as Man, Virtue, Benevolence, Religion—are real and independent entities; opposed to *nominalists*. RE'ALIS'TIC, a. *-tĭk*, pert. to or characteristic of a realist. RE'ALISM, n. *-izm*, doctrines of the realists: see NOMINALISM; also IDEA (and references under it).

REALLEGE, v. *rē'ăl-lĕj'* [*re-*, back or again, and *allege*]: to allege again.

REALM, n. *rĕlm* [OF. *realme*; F. *royaume*; It. *reame*, a kingdom: OF. *roial, real*; F. *royal*, royal—from L. *rēgālis*, royal]: the dominions of a king or sovereign; a royal jurisdiction; kingly government; the state.

REAL PRES'ENCE, in the Eucharist: doctrine forming an article in the belief of the Roman, the Greek, and other Eastern churches, and of some bodies or individuals in other Christian communions, according to which it is held that, under the appearance of the bread and wine in the communion of the Lord's Supper after consecration by the priest, Christ himself is really and substantially present, body and blood, soul and divinity. The word *really* is used in opposition to 'figuratively;' and the decree of the Council of Trent, the authoritative

expositor of the Rom. Cath. belief, conjoins with that word the terms 'truly' and 'substantially,' the former being used to exclude the notion of a barely *typical* representation, such as is recognizable in the paschal lamb and the other Messianic types of the old Law; and the latter for the purpose of meeting the view ascribed to Calvin, that Christ, as apprehended by the faith of the believer, was, for such believer, rendered virtually present in the Eucharist, and that his body and blood were received in virtue and efficacy, though not in corporeal substance. The belief of the Roman and Eastern churches, as to the reality of the presence, was shared by Luther, who, however, differed from Rom. Catholics as to the mode; and has always been followed also by one school of divines in the Anglican Church, whose doctrine became very prominent in the time of Laud, and was revived in the Tractarian movement. But between Rom. Catholics and all other schools of whatever class, one marked difference exists. According to the former, the presence of Christ in the consecrated Eucharist is *permanent;* so that he is believed to be present not alone for the communicant who receives the Eucharist, during the time of his communion, but also remains present in the consecrated hosts reserved after communion. On the contrary, all the Lutherans, and almost all Anglicans, confine their belief of the presence to the time of communion, and all, with hardly an exception, repudiate the worship of the reserved elements, as it is practiced in the Roman Church.

The question as to the *reality* of Christ's *presence* in the Eucharist is quite distinct from that which regards the *mode* of the presence, for which see TRANSUBSTANTIATION.

REALTY, n. *rē′ăl-tĭ* [Sp. *real*—from L. *rēgālis*, royal: F. *roi*, a king]: in *OE.*, royalty; loyalty; faithfulness.

REAM, n. *rēm* [AS. *reama*, what binds up or covers: Ar. *risma*, a bale or packet, especially of paper: Sp. *resma*, a ream of paper: Dut. *riem*, a strap or thong, a bundle: comp. Fin. *rihma*, a bundle of 40 squirrels' skins]: a quantity of paper consisting of 20 quires, each quire comprising 24 folio sheets; among *printers*, sometimes 21½ quires.

REAM, v. *rēm* [Ger. *räumen*, to remove, to clear away —from *raum*, room]: in *block-making*, to level out or increase the size of a hole with an instrument. REAM′ING, imp. REAMED, pp. *rēmd.* REAM′ER, n. *-ẽr*, an instrument for enlarging a hole in a bevelled form.

REANIMATE, v. *rē-ăn′ĭ-māt* [*re*, back or again, and *animate:* F. *ranimer*]: to revive; to restore to life, as a person apparently dead; to infuse new life or courage into. REAN′IMA′TION, n. *-ĭ-mā′shŭn*, act of reanimating.

REANNEX, v. *rē′ăn-nĕks′* [*re*, back or again, and *annex*]: to annex again; to reunite.

REAP, v. *rēp* [AS. *rīpa*, a handful of corn in the ear; *rīpan*, to harvest the corn: Goth. *raupjan*: Ger. *raufen*: Dut. *rapen*: Low Ger *reppen*, to pluck: comp. Gael. *reub*, to rend]: to cut with a sickle or machine, as grain at harvest; to obtain; to receive as a reward; to perform the operation of reaping, to receive the fruit of labor or work. **REAP'ING**, imp. (see below). **REAPED**, pp. *rēpt*. **REAP'ER**, n. *-ėr*, one who or that which reaps. **REAPING-HOOK**, an instrument used in cutting down grain with the hand, a sickle. **REAPING-MACHINE**, machine propelled by horse-power for cutting and laying down grain, which has to a great extent superseded the labor of reaping with the hand: see **REAPING**.

REAP ING: act of cutting grain: has been performed from time immemorial with an instrument called a reaping-hook or sickle. The sickles in use among the ancient Jews, Egyptians, and Chinese appear to have differed very little in form from those in use in this country. The reaping-hook is a curved instrument about 18 inches in length, tapering from a breadth of about two inches at the butt-end, where it is fixed into a wooden handle. The edge is sometimes serrated; but, as a rule, it has long been made plain and sharp like a knife. In reaping, the harvester takes the grain in his left hand, and then with the hook cuts the stalks as close to the ground as possible; but when a grass crop has been sown down with the grain, the stubble is often left rather longer to preserve the young grass. The grain is placed handful by handful in a band usually made of the corn, and when as much has been cut as will form a sheaf, it is tied up by the 'bandster.' The most expert reapers slash down the grain with the hook in the right hand, using the left merely to keep the grain from falling, until sufficient to make a sheaf has been cut, when the reaper places his hook under the grain, and, supporting it with his left arm, deposits it all at once in the band. A bandster (one to every *three* or *four* reapers) binds the grain, and sets it up in stooks of generally 12 sheaves.

The scythe, in some countries, years ago, was preferred to the sickle: among the varieties in use were: the Hainault scythe—a Belgian implement, the cradle scythe, and the common scythe fitted with a cradle. The Hainault scythe consists of a blade about 2 ft. 3 inches long, having a handle 14 inches long. This the mower holds in his right hand, while in his left he carries a hook, with a handle of about equal length. 'The reaping,' says Henry Stephens, in *Book of the Farm*, 'is done by pressing the back of the hook with the left hand against the standing corn [grain], in the direction of the wind, and by cutting with the scythe close to the ground against the standing corn [grain] with a free swing of the right arm,' the hook keeping the cut grain from falling until a sufficient quantity to form a sheaf has been cut. The cradle scythe is composed of a blade about 3½ ft. long, attached to a principal helve or snath

about 4 ft. long, into which another helve of about 2¼ ft. in length is tenoned, thus making two handles. The cradle or bow is a piece of wood jointed to the heel of the blade, into which are inserted three or four wooden teeth, in a line with the blade, the object of which is to secure the grain being laid evenly in one direction. As skill at the working of the scythe, however, increased, the cradle or bow was discarded in many cases.

Reaping and Mowing Machines.—The process of reaping with either the sickle or the scythe is tedious and expensive; and since the last part of the 18th c., many attempts have been made to do the work by machinery—attempts which, in later years, have been completely successful. Reaping by machinery, however,

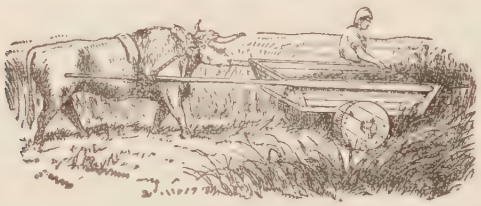


Fig. 1.—Ancient Reaping-machine.

is no modern invention. Pliny the Elder, born early in the first c., found a reaping-machine in Gaul. He says: 'In the extensive fields in the lowlands of Gaul, vans of large size, with projecting teeth on the edge, are driven on two wheels through the standing grain by an ox yoked in a reverse position. In this manner the ears are torn off, and fall into the van.' Palladius, about four centuries later, found a similar appliance for reaping in Gaul. He gives a more detailed but similar description of the machine. The annexed cut, from Woodcroft's *Appendix to the Specifications of English Patents for Reaping-machines*, represents what is conceived, from the descriptions, to have been the form of this ancient reaper. The first modern reaping-machine appears to have been made by Pitt, in England, 1786. Many improvements were made, but till 1850 the sale of machines was quite limited. In 1826 the Rev. Patrick Bell, of Scotland, constructed a machine which had some of the important features adopted in later styles, and for which he received public recognition as a benefactor to agriculture. In the United States also, various inventions were made. Obed Hussey invented 1833, and perfected 1837, the form of guards and cutters now in use, thus making a wonderful improvement over all previous styles. Cyrus H. McCormick patented 1834, and added improvements to 1845 and 1847, a reaper which did excellent work, and which took the gold medal at the World's Fair, London, 1851.

Previous to 1833 most of the mechanical reapers were

pushed in front of the team. The transfer of the team to the front, and of the cutter-bar to the right-hand side of the frame, added greatly to the efficiency of the machines. To the front of the cutter-bar are fastened numerous iron or steel guards, or fingers, which project 7 or 8 in., and through slits in which the cutters pass. These cutters are made of triangular plates of steel,

Twine Binding Harvester.

resembling large saw-teeth, which are fastened to a flat bar which is given a vibratory motion lengthwise of the cutter-bar. This motion is communicated from the driving wheel or wheels, which carry the frame of the machine, by means of gear-wheels of various sizes, and which have a crank connection with the bar to which the cutters are fastened. The stalks of the grain are

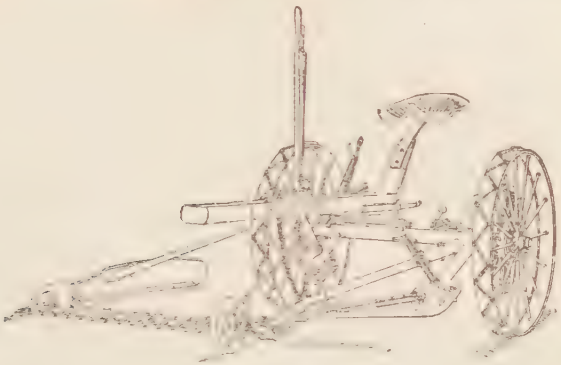
held in place by the guards while the knives do the cutting.

That the present perfection has been secured by a multitude of changes is shown by the fact that previous to 1886 more than 5,000 patents for reaping-machines, and parts of machines, had been issued, and many new ones are added every year. A platform on which a man could stand and rake the grain into bundles; the addition of an automatic rake; a 'dropper' to lay the grain in bundles; and changeable gears which allowed the same machine to be used for both reaping and mowing —were among the improvements. In 1865, self-rakers, which had been used only on the one-wheel machines, were constructed for the machines with two drive-wheels. Self-binders were afterward introduced. Drawn by 2 horses, they cut a strip 5 to 7 ft. wide. These machines not only cut and gathered the grain, but tied it into bundles with wire; but this material proved very objectionable, and 1869 a device for tying the sheaves with cord was patented. This has been somewhat modified and improved, and has been so largely used in recent seasons as to require about 60,000 tons of twine per year. Efforts are now (1891) being made to perfect and introduce a machine which will bind the grain with straw.

On the immense wheat-fields of the far west, machines known as 'headers' were introduced several years ago. They cut off the tops of the grain, from 8 to 20 in. long, and place them in huge wagons drawn by the side of the machines and in which they are taken to steam-threshers located in the fields. Connected with some of these headers is a thresher and cleaner, so that by once passing over the ground the grain is cut, shelled, cleaned, and put into sacks. As many as 26 horses or mules are often used to draw a header, and traction engines are frequently employed. Headers drawn by animal-power cut from 8 to 16 ft. wide. Some of the steam-machines are of enormous size and cut a swath 40 ft. wide.

Mowing-machines were invented later than reapers, and in cutting apparatus and manner of communicating motion closely resemble them. As above indicated, some reapers can be changed into mowers. For the mowing-machine no reel or platform is needed; the grass falls where it stood, and the cutter-bar is arranged to rise and fall and thus adapt itself to the surface of the land. In 1853 a machine which was moderately successful was invented by C. Wheeler. This was soon followed by the Buckeye, and by other valuable machines. There are now many different styles. Some have the cutter-bar in front of the drive-wheels; some in the rear; a few, by an ingenious mechanical contrivance, place it on a direct line with the axle, the pitman rod playing through the right-hand wheel, the centre of which is stationary; and there are one or more in which it is directly behind the team. In 1870 a machine with a differential gear which converted the rotary motion of

the drivers directly into the reciprocating motion of the knife was invented and had considerable success. Machines drawn by 2 horses cut from 4 to 7 ft. wide, and smaller sizes are made for a single horse.



Mowing-machine.

Lawn-mowers, for keeping the grass closely and evenly cropped on smooth lawns, are made on a different principle from the ordinary mowing-machine. They have a heavy roller which acts as a driving-wheel and by means of various gears gives a rapid motion to spiral knives which revolve closely against a straight-edged knife and shear off the grass. The height of the cut is regulated by two small adjustable wheels in front of the machine. Most styles used in the United States leave the cut grass on the ground, but a few have a box in which it is collected and can be removed. The small sizes, cutting 10 to 20 in. wide, are worked by hand, being pushed in front of the operator. Larger sizes, cutting 25 to 40 in., are drawn by one or two horses.

The first machines, for either reaping or mowing, which approached perfection were made in the United States, and this country has constantly kept in advance of all others. Large numbers of machines are exported to all parts of the world in which machines for cutting grain or grass are used. In manufacture of these machines for the home and foreign market about 10,000 skilled workmen are employed. The home demand for combined reapers and mowers, and for reapers without binders, is diminishing, but the number of self-binders sold is rapidly increasing.

The invention of reaping-machines has led to a vast increase in production of wheat, as it has enabled farmers to grow wheat on immense areas which could not possibly have been harvested by the slow and toilsome processes previously followed. It has been claimed that during the haying and harvest seasons the use of the mowing and reaping machines employed saves the labor of not less than 2,000,000 men.

REAPPAREL, v. *rē'ăp-păr'ĕl:* to clothe again.

REAPPEAR, v. *rē'ăp-pēr'* [*re*, back or again, and *appear*]: to appear a second time. RE'APPEAR'ANCE, n. *-ăns*, a second appearance.

REAPPLY, v. *rē'ăp-plī'* [*re*, back or again, and *apply*]: to apply again. RE'APPLICA'TION, n. *-pli-kā'shŭn*, a second application.

REAPPOINT, v. *rē'ăp-poynt'* [*re*, back or again, and *appoint*]: to appoint again. RE'APPOINT'MENT, n. a second appointment.

REAPPORTION, v. *rē'ăp-pōr'shŭn* [*re*, back or again, and *apportion*]: to apportion again.

REAR, n. *rēr* [OF. *rière*, rear—from L. *retro*, behind: F. *arrière*, behind]: the part behind the rest; the part of an army or fleet behind the other; the last class; the last in order. REAR-ADMIRAL, an admiral of the third rank. REAR GUARD, the portion of an army marching behind to cover and protect the main body. REAR LINE, the last rank of a battalion, etc., when drawn up in open order. REAR RANK, the hindermost rank of a body of troops. REARWARD, n. *rēr'wĕrd*, the last troop; the train behind: AD. at or toward the rear.

REAR, v. *rēr* [another form of *raise*, which see: AS. *ræran*, which stands for *ræsan*, to rear, to raise]: to raise; to stir or rouse up; to breed, as cattle; to bring up to maturity, as a family; to educate or instruct; to rise on the hind legs, as a horse; to build; in *OE.*, to lift up from a fall; to move upward; to rouse; achieve. REAR'ING, imp.: N. bringing up; building up. REARED, pp. *rērd*.—SYN. of 'rear': to raise; lift up; educate; instruct; exalt; elevate; breed; erect; set up; establish.

REARMOUSE: see REREMOUSE.

REASCEND, v. *rē'ăs-sĕnd'* [*re*, back or again, and *ascend*]: to rise, mount, or climb again. RE'ASCEN'SION, n. *-sĕn'shŭn*, a remounting. RE'ASCENT', n. *-sĕnt'*, a fresh ascent.

REASON, n. *rē'zn* [F. *raison*; Sp. *razon*; It. *ragione*, reason—from L. *ratiōnem*, judgment, understanding, a computation; *ratus*, calculated—from *rĕor*, I think]: that power or faculty in man which eminently distinguishes him from the other animals, enabling him to deduce inferences from facts or propositions, and to distinguish good from evil, and truth from falsehood: a thought or a consideration as bearing on a question; cause; ground; motive: clearness of faculties; that which justifies or supports a determination, or a plan, etc.; final cause; end or object sought; justice; moderation; purpose; design: V. to debate or discuss; to persuade by argument; to deduce inferences justly from premises; to raise disquisitions; to make inquiries. REA'SONING, imp.: N. the act or process of exercising the faculty of reason: see REASON (below): arguments employed. REA'SONLESS, a. *-lĕs*, destitute of reason;

not warranted or supported by reason; irrational; unreasonable. REASONED, pp. *-znd*. REA'SONER, n. *-ėr*, one who reasons; an arguer. REA'SONABLE, a. *-ă-bl*, endowed with or governed by reason; moderate; not excessive; sane. REA'SONABLY, ad. *-ă-blĭ*. REA'SONABLENESS, n. *-bl-nĕs*, the quality of being reasonable; the state or quality of a thing which justifies; moderation. BY REASON OF, by means of; on account of. IN REASON or IN ALL REASON, in justice; on rational grounds.—SYN. of 'reason, n.': cause; purpose; design; ground; principle; argument; motive; sake; ratiocination; right; justice; rationale; moderation; consideration; account; object;—of 'reasonable': just; rational; tolerable; moderate; honest; equitable; fair.

REASON: that function of the human Intelligence having reference to the attainment of truth out-side the sphere of immediate cognition—thus, often truth in its highest and largest range. We know many things by immediate or actual experience. Our senses tell us that we are thirsty, that we hear a sound, that we are affected by light: these facts are truths of Sense, or of immediate knowledge, and do not involve the reason. R. comes into activity when we know a thing not immediately but by some indirect process; e.g., seeing a river unusually swollen, we reason (infer) that there have been heavy rains at its sources. Here the mere sense tells us only that the river is high; it is by certain transitions of thought, or by our reasoning powers, that we come to know the other fact that in a remote part of the country there have been heavy rains.—It must, however, be remembered that the term Reason is used by different writers in a variety of applications as concerns man's intellectual and spiritual nature.

In ascertaining these truths of R., or of Inference, as they are called, there are various steps or operations, described under different names. (1) DEDUCTION or SYLLOGISM; (2) INDUCTION; (3) GENERALIZATION of Notions, of which ABSTRACTION and DEFINITION are various phases (see these several titles). The nature of the function or faculty denominated R., or the Reasoning Faculty, can be explained by showing how it results from the fundamental powers of the Intelligence: see ASSOCIATION OF IDEAS.

There is another and peculiar signification attached to the word Reason, growing out of the philosophy of Kant. He maintained the existence of certain principles or cognitions *a priori*, or of intuitive origin, and not derived from experience; e.g., cause and effect, the axioms of mathematics, etc.: see COMMON SENSE. It was a function of the R., according to him, to recognize those principles; while the generalizations of mere experience, as that water extinguishes fire, were proved by the Understanding. Other philosophers give the name 'Noetic faculty' [Greek, *nous*] to the same function. Hamilton calls it the 'Regulative faculty.'

REASON, Worship of: incident in French history. 1793, Nov. 10, the French national convention ordered the worship of the Goddess of Reason. Madame Maillard, selected as such a goddess, was drawn on a splendid car to the cathedral of Notre Dame to receive homage from the multitude. For some time afterward that cathedral was designated the Temple of Reason.

REASSEMBLE, v. *rē′ăs-sĕm′bl* [*re*, back or again, and *assemble*]: to assemble or convene again; to collect anew. Re′assem′blage, n. assemblage a second time.

REASSERT, v. *rē′ăs-sĕrt′* [*re*, back or again, and *assert*]: to assert again; to maintain after an interval of suspension or cessation.

REASSIGN, v. *rē′ăs-sīn′* [*re*, back or again, and *assign*]: to transfer back what has been assigned.

REASSIMILATE, v. *rē′ăs-sĭm′ĭ-lāt* [*re*, back or again, and *assimilate*]: to change again into a like substance; to cause to resemble anew.

REASSUME, v. *rē′ăs-sūm′* [*re*, back or again, and *assume*]: to assume or take again. Re′assump′tion, n. *-sŭm′shŭn*, a second assumption.

REASSURE, v. *rē′ăs-shōr′* [*re*, back or again, and *assure*]: to restore courage to; to insure a second time against loss; also Reinsure. Re′assu′rance, n. *-shō′răns*, an assurance of property by an underwriter to relieve himself from the risk he has undertaken; also Reinsurance.

REASTY, a. *rēs′tĭ*: OE. for Rusty, which see.

REATTACH, v. *rē′ăt-tăch′* [*re*, back or again, and *attach*]: to attach a second time. Re′attach′ment, n. a second attachment of the same person or thing.

REATTEMPT, v. *rē′ăt-tĕmpt′* [*re*, back or again, and *attempt*]: to attempt again.

RÉAUMUR, *rā-ō-mŭr′*, René Antoine Ferchault de: naturalist and physicist: 1683, Feb. 28—1757, Oct. 17; b. La Rochelle, dept. of Charente-Inférieure, France. He studied in the Jesuits' College at Poitiers, and afterward at Bourges. With an eye observant of facts of every kind, and an indiscriminate thirst for information, he gave special attention to physics, natural history, and mathematics. In 1703, he went to reside at Paris, where he speedily attracted general attention by the publication of three geometrical Memoirs on particular cases of the intersection of lines; and 1708, he was elected a member of the Acad. of Sciences, and was charged with supervision of the work *Description des divers Arts et Métiers*, published under the auspices of the government. R. lightened his labors with occasional researches 1708–15 into various subjects of nat. history. The collections of Memoirs of the Acad. of Sciences 1722–25 contain a number of papers by R., in which he details his discoveries of the mode of producing steel from iron (an art till then unknown in France), of the

tendency which fused metals have to become crystallized, and of the mode of tinning iron (also till then unknown in France). For these brilliant and valuable successes, he received from the French govt. 12,000 livres, which he spent in promoting and encouraging the industrial arts. Notable was his invention of the *Thermometer* (q.v.) which bears his name. He died of a fall from a horse at his estate of Bermondière, dept. of Maine; leaving a voluminous collection of works on scientific subjects, also a treatise on 'the silk of spiders,' translated into Manchu by command of the Emperor of China; and a number of Mémoirs (1731–40), containing his thermometric researches on air, etc. But by far his most important work is *Mémoires pour servir à l'Histoire des Insectes* Amsterdam 12 vols. 1737–48), which embodies original observations and discoveries concerning habits and instincts of insects, sufficient to immortalize their author. Only six vols. of this work have been published, the 7th being incomplete. The Acad. of Sciences obtained, by the terms of R.'s will, his collections of minerals, plants and valuable MSS.

RÉAUMUR'S THERMOMETER, *rā-ō-mürs':* a thermometer, named after its inventor, in which the distance between the freezing and boiling points of water is divided into 80°, the freezing-point being marked 0°.

REAVE, v. *rēv* [AS. *reaf*, spoil; *reafian*, to seize, to take hold of: Icel. *rifa*, to tear asunder: Ger. *rauben*, to plunder; *raub*, spoil: comp. L. *rapiō*, I seize]: in *OE.*, to take away by violence or stealth. REFT, pt. pp. *rĕft*, deprived; bereft. REAV'ER, n. *-ėr*, a robber.

REAVOW, v. *rē-ă-vow* [*re*, back or again, and *avow*]: to vow again.

REBAPTIZE, v. *rē-băp-tīz'* [*re*, and *baptize*]: to baptize a second time. REBAP'TISM, n. a second baptism.

REBATE, v. *ré-bāt'* [F. *rabattre*, to abate, to beat or press down—from *re*, and *abattre*, to beat down]: to blunt; to deprive of keenness: to deduct from: *N.* deep longitudinal groove, cut in a piece of timber, to receive the edge of another piece, or the ends of a number of pieces of wood; also a notch, such as that in a door-stand-

Rebate.

ard for the door, is called a rebate; and in masonry, such a joint is called a joggle: rebate denotes also a hard freestone used for paving. REBA'TING, imp. REBA'TED, pp. in *her.*, having the points broken off or cut short. REBATE', n. or REBATE'MENT, n. *-mĕnt*, a deduction from, as of discount or interest.

REBEC, or REBECK, n. *rē'bĕk* [F. *rebec*—from It. *ribeca*; Sp. *rabel*; Pers. *rubab*]: ancient musical instrument of the violin kind, of which the body, instead of consisting of two hemispherical enlargements, like other instruments of the same tribe, was narrow toward the neck, and gradually enlarged till it rounded off at the lower end. It had a bridge, and three strings tuned in

Rebec of the Sixteenth Century.

fifths, and was played with a bow. The earliest known representation of the R., however, taken by the Abbé Gerbert from a MS. of the 9th c., gives it but one string. The Moors introduced the R. from the East into Spain, whence it spread over Europe, and was the precursor of the violin. The four classes of rebecs, treble, alto, tenor, and bass, were favorite instruments of the minstrels of the middle ages, and were used both for the dance and to accompany street-singing. Milton in his *L'Allegro*, characterizes this instrument as the 'jocund rebec.'

REBEL, n. *rĕ'bĕl* [F. *rebelle*, to rebel, to revolt—from L. *rebellārĕ*, to rebel—from *re*, back or again; *bellārĕ*, to make war—from *bellum*, war]: one who revolts and makes war against constituted authorities; one who takes up arms against the authority of a govt. to which he owes allegiance; in *feudal law*, one who disobeyed his lord: ADJ. rebellious: V. *rē-bĕl'*, to take up arms and openly resist a constituted govt. to which allegiance is due; to revolt. REBEL'LING, imp. REBELLED', pp. *-bĕld'*. REBEL'LION, n. *-bĕl'yŭn* [F.—L.]: open and avowed resistance to a govt. by force of arms. Unlike insurrection, which may be merely an opposition to a particular law rebellion involves a design to renounce the whole authority of the state.—The expression 'The Great Rebellion' is generally applied in England to the revolt of the Long Parliament against the authority of Charles I. It began with the votes of the two houses regarding the militia 1642, by which they endeavored to seize the military power of the country, and the departure of the king for York, which was immediately followed by the breaking out of hostilities; and the civil war was, properly speaking, terminated by the submission of Charles to the Scots, 1646, Apr.; though, in a loose sense, the period of the rebellion is usually held to include the Commonwealth or Protectorate, and to extend to the restoration of Charles II., 1660, May.—The revolts in behalf of the House of Stuart 1715 and 45 are often, particularly in Scotland, spoken of emphatically as 'The Rebellion.' The former rising in favor of the Chevalier de St. George, son of James II. of England, called the

Old Pretender, was headed by the Earl of Mar, and put down 1716: the latter was led by Prince Charles Edward, known as the Young Pretender, who, landing in the Hebrides, was joined by the Highland chieftains and numerous followers, and after taking possession of Edinburgh, and marching to Derby, retreated into Scotland, and was defeated with great slaughter by the Duke of Cumberland at Culloden, 1746, Apr. 16. REBEL'LIOUS, a. *-yŭs*, opposing a government by force of arms, to which allegiance or obedience is due; disobedient. REBEL'LIOUSLY, ad. *-lĭ*. REBEL'LIOUSNESS, n. *-nĕs*, the quality or state of being rebellious.—SYN. of 'rebellion': insurrection; revolt; mutiny; sedition; contumacy; resistance; revolution.

REBEL LION, WAR OF THE; or THE CIVIL WAR: see UNITED STATES OF AMERICA.

REBITING, n. *rē-bī'ting* [*re*, back or again, and *biting*]: the act of restoring worn lines on an engraved plate by means of the action of an acid.

REBOSO, n. *rā-bō'sō* [Sp.]: a scarf or long shawl worn over the head and shoulders by Spanish women in the southern states.

REBOUND, v. *rē-bownd'* [*re*, back or again, and *bound*]: to start or spring back; to drive back; to reverberate: N. the act of starting or springing back; a recoil. REBOUND'ING, imp.: ADJ. re-echoing. REBOUND'ED, pp.: ADJ. produced by a rebound.

REBREATHE, v. *rē-brēth'* [*re*, back or again, and *breathe*]: to breathe again.

REBUFF, n. *rē-bŭf'* [L. *re*, back or again; It. *buffo*, a blurt or puff with the mouth made at one in scorn; *rabbuffo*, a rebuke; *rabbuffare*, to disorder, to rebuke: F. *rebuffade*, a repulse]: a sudden check; refusal; a sudden and unexpected repulse; a defeat: V. to refuse quickly and suddenly; to reject solicitation. REBUFF'ING, imp. REBUFFED', pp. *-bŭft'*.

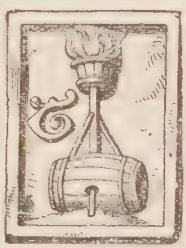
REBUILD, v. *rē-bĭld'* [*re*, back or again, and *build*]: to build again; to renew a structure.

REBUKE, v. *rĕ-būk'* [F. *rebâquer*, to answer saucily—from *re*, back; *bec*, a beak: Bret. *rébecha*, to reprove: It. *ribeccamento*, a check or rebuke; *rimbeccare*, to beat back, to retort back]: to reprove or reprimand for a fault; to check by reproof; in *Scrip.*, to afflict; to chasten; to check; to calm: N. a reproof or reprimand for faults; a chiding into silence; in *Scrip.*, chastisement; affliction for correction. REBUK'ING, imp. REBUKED', pp. *-būkt'*. REBUK'ER, n. *-ĕr*, one who rebukes. REBUK'ABLE, a. *-ă-bl*, deserving of rebuke. REBUK'INGLY, ad. *-lĭ*. TO BE OR LIVE WITHOUT REBUKE, to live blamelessly.—SYN. of 'rebuke, v.': to chide; check; chasten; reprove; silence; restrain; blame; censure; condemn; reproach; upbraid; reprimand; animadvert; reprehend. *Note.*—REBUKE is derived by some from OF. *rebouquer*; F. *re-*

boucher, to blunt, to rebuff—from L. *re*, back; prov. F. *bouque*; F. *bouche*, the mouth—from L. *bucca*, the cheek.

REBURY, v. *rē-bĕr′ī* [*re*, back or again, and *bury*]: to inter again.

REBUS, n. *rē′bŭs*, plu. REBUSES, *rē′bŭs-ĕz* [L. *rebus*, by means of or from things]: enigmatical representation of a name or thing by using pictorial devices for letters, syllables, or parts of words; a riddle in which words or phrases are represented by pictures of things whose names chance to resemble them in sound. The term originated probably from the device speaking to the beholder *non verbis sed rebus*. Devices of this kind, allusive to the bearer's name, were exceedingly common in the middle ages, particularly in England. In many instances, they were used by ecclesiastics and others who had not a right to armorial ensigns. Thus, on the rector's lodgings at Lincoln College, Oxford, erected in the 15th c., to which Thomas Beckyngton, Bp. of Bath and Wells, liberally contributed, is carved the rebus of that prelate—a beacon and tun, with *T*, the initial letter of his Christian name. In Westminster Abbey, Abbot Islip's chapel gives two forms of his rebus—one, a human eye and a small branch or slip of a tree; the other, a man in the act of falling from a tree, and exclaiming, 'I slip!' Many of the monograms of the artists of the middle ages and early printers were rebuses: that of Ludger von Ring was the letter *L* inserted into a ring. A large proportion of the early coats of arms were rebuses on the names of the bearers of them—e.g., a lock and heart for that of Lockhart. Family badges are also frequently of the nature of a rebus, and mottoes, as *Ver non semper viret* of the Vernons.



Rebus of Bishop Beckyngton.

Rebus of Abbot Islip, Westminster Abbey.

REBUT, v. *rĕ-bŭt′* [F. *rebuter*, to put or thrust back: It. *ributtare*, to cast back, to reject; *buttare*, to throw or fling (see BUTT 1)]: to oppose by argument; to repel; in *law*, to return an answer; in *OE.*, to beat back; to keep off. REBUT′TING, imp. REBUT′TED, pp. REBUT′TAL, n. *-ăl*, contradiction; refutation. REBUT′TER, n. *-ĕr*, in *law*, a plaintiff's answer to a defender's rejoinder. REBUTTING, n. *rĕ-bŭt′ĭng*, in *curling*, an effort of strength and hazard by the player in driving his stone toward the *tee*, in the hope of some benefit turning up for his side in hitting the other stones at and about the *tee*.

RECALCITRATE, v. *rē-kăl'sĭ-trāt* [L. *re*, back; *calcĭtrātus*, a kicking—from *calx* or *calcem*, the heel]: to kick back; to express repugnance. RECAL'CITRATING, imp. RECAL'CITRATED, pp. RECAL'CITRANT, a. *-trănt*, kicking back; showing repugnance; refractory; rebellious. RECALCITRA'TION, n. *-trā shŭn*, a kicking back; repugnance.

RECALL, v. *rē-kawl'* [*re*, back or again; and *call*]: to call back or again; to revoke; to call back from some place or mission; to revive in the mind: N. the act or power of calling back; a revocation.

RECAMIER, *rā-kā-mē-ā'*, JEANNE FRANÇOISE JULIE ADELAIDE (BERNARD), Madame: 1777, Dec. 4—1849, May 11; b. Lyons: perhaps the finest representative specimen, in later times, of that character peculiarly French, the 'woman of society,' the potentate in petticoats, who sways the *salon*, and becomes in doing so a sort of 'unacknowledged legislator.' Her father was a banker of that city, and, as well as her mother, was distinguished by much of the personal grace and charm which in the daughter seem to have culminated in almost typical perfection. She was beautiful, and had a rare and indefinable fascination. She was educated under the charge of an aunt in the convent of La Déserte; and at about the age of 15, she went to Paris to join her parents, and soon was married to Jacques Récamier, rich banker about thrice her own age. The union is said to have been scarcely in the ordinary sense connubial ('M. Récamier n'eut jamais que des rapports paternels avec sa femme'); but a mutual affection and respect influenced it from the first, and preserved it to the end. A record of the splendid social triumphs of Madame R. would involve notice of nearly all that was distinguished in Paris during about 50 years. In a strange, impalpable, yet most real way, she became a power; and she continued so despite changes of fortune. To the famous Madame de Staël, she was bound by ties of extreme affection and intimacy; and when her friend was banished from Paris, as having drawn on her the petty jealousy of Napoleon, Mme. R. lavished her sympathy on the brilliant exile. Afterward the complete ruin of her husband's fortunes induced her to accept an invitation from Madame de Staël to join her at Coppet, in Switzerland (1806). Here she was thrown into the society of Prince August of Prussia, and a mutual attachment ensued. It is supposed that, of all her innumerable admirers, he alone succeeded in touching her heart. A marriage was arranged, whose necessary condition was the consent of her husband to a divorce. This was not refused; but his mild and touching remonstrance sufficed to divert from her purpose a woman of generous feeling: the man whose brilliant prosperities she had shared, she shrank from deserting in the decay of his fortune. The most distinguished friend of her later years was M. de Chateaubriand, who, becoming a widower 1846, wished to marry Madame R., a widow since 1830; but the lady

declined the honor. Till the last day of Chateaubriand's life, he found in the friendship of Madame R. almost his only cheer and satisfaction. She holds a historic place among the French queens of society. Not so brilliant as some of them, she was obviously much more correct and estimable than most, on a ground of virtue or of coldness; and she seems to have moved in some atmosphere of bewildering charm. See *Souvenirs et Correspondance tirés des Papiers de Madame R.*, edited by her niece, Madame Lenormant (1859, 4th ed. 1873), and *Madame Récamier*, by the same (1872); also biography by Brunier (1875).

RECANATI, *rā-kâ-nâ'tē:* town of central Italy, province of Macerata, 14 m. s. of Ancona; a powerful military position in the 11th c. Pop. (1881) 5,824.

RECANT, v. *rĕ-kănt'* [L. *recanto*, I sound back, I recall—from *re*, back or again; *canto*, I sing: It. *ricantare*, to sing again]: to recall words; to retract former words or a former declaration; to unsay something formerly said. RECANT'ING, imp. RECANT'ED, pp. RECANT'ER, n. *-ér*, one who recants. RECANTATION, n. *rē'kăn-tā'-shŭn*, the act of recalling; a declaration that contradicts a former one.—SYN. of 'recant': to recall; revoke; retract; abjure; disown; disavow; renounce; repudiate.

RECAPITULATE, v. *rē'kă-pit'ū-lāt* [F. *récapituler*, to recapitulate — from mid. L. *recapitulārĕ* — from L. *re*, back or again; *capit'ŭlum*, a small head—from *caput*, the head]: to go over again the principal things mentioned or written, as in a discourse or essay; to detail again. RE'CAPIT'ULATING, imp. RE'CAPIT'ULATED, pp. RE'-CAPIT'ULA'TION, n. *-lā'shŭn* [F.—L.]: a summary or concise statement of the principal heads or points in a discourse or essay. RE'CAPIT'ULATORY, a. *-tér-ĭ*, repeating. —SYN. of 'recapitulate': to reiterate; repeat; rehearse; recite.

RECAPTION, n. *rē-kăp'shŭn* [L. *re*, back or again; *captus*, laid hold of, seized—from *capĕrĕ*, to seize]: reprisal; the act of retaking one's own goods, chattels, etc., from one wrongfully retaining them. RECAP'TOR, n. *-tér*, one who takes a prize which had formerly been taken. RECAP'TURE, v. *-tūr*, to retake: N. the act of retaking.

RECARBONIZE, v. *rē-kâr'bō-nīz'* [*re*, back or again, and *carbonize*]: to carbonize again; to introduce carbon again after its withdrawal.

RECAST, v. *rē-kăst'* [*re*, back or again, and *cast*]: to cast again; to mold anew; to compute a second time. RECAST'ING, imp. molding anew.

RECEDE, v. *rĕ-sēd'* [F. *recéder*, to recede—from L. *recedĕrĕ*, to fall back—from *re*, back; *cedo*, I go or move: It. *recedere*]: to retreat; to withdraw; to desist. RE-CE'DING, imp. RECE'DED, pp.—SYN. of 'recede': to retreat; retire; withdraw; return; retrograde; desist.

RECEIPT, *n.* *re-sēt'* [OF. *recete*; F. *recette*; It. *ricetta*, a receipt—through mid. L. *recepta*, a receipt—from L. *receptus*, received or taken back—from *re*, back; *captus*, taken; *capere*, to take]: act of receiving: a written acknowledgment of having received goods or money, etc. (see below): written instructions for compounding certain ingredients, as for making a cake, etc.—see, however, *Note* under RECIPE: V. to sign a written acknowledgment of having received goods, money, etc. RECEIPTING, *imp.* RECEIPTED, *pp.* RECEIPT-BOOK, a book containing instructions or prescriptions; a book containing printed forms of receipts, to be filled up as may be required, in acknowledgment of having received goods, money, etc. RECEIPT-STAMP, in *Britain*, a government stamp affixed to all accounts at settlement, or to any acknowledgment of the receipt of money, when such amount to £2 or upward. RECEIPT OF CUSTOM, in *Scrip.*, the office or post of the collector of the Roman taxes.

RECEIPT, *re-sēt'*: popular and legal term to signify the acknowledgment of a payment of a sum of money in discharge of a debt due or a demand. It is commonly believed among laymen that a R. is the only legal proof of such payment and that it is absolutely conclusive upon the party signing it. This is a mistake; a R. is only one method of proving payment, and it may always be explained by oral extrinsic evidence; it is thus only presumptive evidence of payment. In this it differs from a release made under seal; such an instrument is conclusive evidence of a complete discharge and can be attacked only on the ground of fraud. A R. for money may always be explained and contradicted by other and oral evidence; it is only presumptive evidence that the sum stated has been paid or that any sum whatever has been paid. A simple R. is not regarded as a contract, and has little more force than the oral admission of the party signing the R. It frequently happens that an instrument reciting a R. for money or goods contains terms, agreements, conditions, and assignments; such an instrument as to everything but the R. has all the force and effect of any contract, and its terms cannot be affected or varied by oral evidence; but the part containing the R. can be so varied as though the paper contained nothing else. Even though a R. be given in 'full of all demands' or in 'full settlement,' unless it be made under seal it will not operate as conclusive satisfaction of the claim, and it may be contradicted by other evidence to show that a less sum of money than the whole claim was paid. A R. made by an authorized agent is as good as one made by the principal; a joint trustee who signs a R. for money, only because the R. without his signature would have no effect, may, unless he is himself in default, show that he did not receive the money, and can thus remove or limit his liability; but a co-executor who is not under the necessity of signing a R., to give it effect, is bound by the R. that he signs.

RECEIVE, v. *rē-sēv'* [F. *recevoir*; It. *recepere, ricevere*, *to* receive, to admit—from L. *recipĕrĕ*, to receive or get back—from *re*, back or again; *capiō*, I take]: to take or obtain from another in any manner, as a gift, a wound, a disease; to accept; to take or obtain intellectually; to embrace; to admit; to welcome; to entertain as a guest; to take in or on; in *Scrip.*, to believe; in *OE.*, to conceive in the mind. RECEIV'ING, imp. RECEIVED, pp. *rē-sēvd'*. RECEIV'ER, n. *-ėr*, one who or that which receives; an officer appointed to receive the public money, or to hold money in trust; in *chem.*, a vessel or receptacle for receiving any product; the glass vessel of an air-pump; one who co-operates with a thief by taking possession for disposal of the goods which he steals—in *thieves' slang*, called 'a fence' (see RECEIVING STOLEN GOODS). RECEIV'ABLE, a. *-ă-bl*, that may be received. RECEIV'ABLY, ad. *-ă-blī*. RECEIV'ABLENESS, n. *-nĕs*, capability of being received. RECEIV'EDNESS, n. *-nĕs*, general allowance or belief. RECEIVING-HOUSE, a store; a place where parcels or letters are left to be collected for transport.—SYN. of 'receive': to allow; admit; take; accept; hold; retain; suffer.

RECEIV'ER, in Law: person appointed by a court of equity to take charge of property, when that property is held in trust or otherwise by some person or party, and there is danger of the property being removed, ruined, wasted, or squandered, or where the interests of third persons in the property, whether present, future, or contingent, are likely to be seriously injured. The R. is an indifferent person between the parties, and usually has the power to do everything in and about the property which it does not seem proper to the court that either one of the parties should do. But he can exercise only such powers as are expressly given to him by the order of the court appointing him. The appointment of a R. is an equitable remedy, and its object is prevention, rather than redress, of injuries; the appointment is always a matter of discretion for the court. This remedy has become so frequent and important that the subject is now governed by statutes in nearly every state; but the courts still cling to the old principles of the courts of equity in relation to the appointment and conduct of receivers. The general rules governing the appointment of a R. are: 1, that the power is to be exercised with great circumspection; 2, the court must be satisfied, generally by affidavit, that the claimant has title to the property and that a R. is necessary to preserve the property; 3, fraud or imminent danger, if the court should not interfere, must be clearly shown; and unless the danger is urgent, the court will not appoint a R. unless notice of the application be given to the defendant in the action. On an application for a R., the court will closely scrutinize the conduct of the applicant, and unless it be perfectly blameless and beyond reproach, no R. will be appointed. The R. is an officer of the court, and, before taking charge of the prop-

erty, he must generally execute and file with the court a bond for faithful performance of his duties; until the bond is approved by the court, he cannot assume control over the property. Being an officer of the court, he cannot sue or be sued, unless leave for such action is first obtained from the court. The effect of the appointment of a R. is to take the possession of the property out of the hands of the parties to the suit; but their right or title to the property is in no way affected by such appointment; his duty is to manage and to preserve the property under the control and with the advice of the court. Receivers are frequently appointed when the legal holders are incapacitated from taking care of the property—e.g., infants and lunatics; when there are disputes between the legal owners; when rights of other parties might be endangered; in cases where disputes arise between buyer and seller; in bankruptcy cases, and in cases of insolvent corporations.

RECEIVING STOLEN GOODS: a crime by the statutes of the various states: it is a state's-prison offense, and the punishment for it is severe; in some states the extreme punishment is imprisonment for five years. The crime is distinct from larceny and consists in buying or receiving any stolen property or any property that has been appropriated wrongfully in a manner to constitute larceny, knowing the same to have been stolen or so appropriated; or corruptly, for a consideration, concealing or withholding or aiding in so concealing or withholding any property, knowing the same to have been stolen or taken in such a manner as to constitute a larceny. In some states it is held that though a person receiving such property with laudable intent is not guilty of the crime, it is for the accused person to show such laudable intent, so that it need not be negatived in the indictment—i.e., felonious intent need not be alleged; in other states a felonious intent must be alleged and proved; but the mere finding of a stolen article in the possession of another is not enough; guilty knowledge must be shown; and for showing guilty knowledge it is competent to show that the accused had frequently received similar articles under like circumstances from the same thief, stolen from the same place or person, knowing that they were stolen. One who negotiates for restoration of stolen property in consideration of receiving a percentage himself may be convicted of this offense. Receiving a stolen bank-bill, knowing it to have been stolen, is not, however, within the statute. If jointly indicted, two persons may be convicted, though each received in the absence of the other.

RECELEBRATE, v. *rē-sĕl'ĕ-brāt* [*re*, back or again, and *celebrate*]: to celebrate again.

RECENCY: see under RECENT.

RECENSION, n. *rē-sĕn′shŭn* [L. *recensiōnem*, a reviewing—from *re*, back; *censĕō*, I reckon]: a review; a critical examination of the text of an ancient author; a revisal.

RECENT, a. *rē′sĕnt* [F. *récent*—from L. *recens* or *recentem*, that has not long existed, fresh: It. *recente*: comp. W. *cynt*, first, earliest]: of late origin or existence; modern; fresh; lately received; not long parted from; not ancient; in *geol.*, that has taken place during the human epoch, or is still in progress. RE′CENTLY, ad. *-li*. RE′CENTNESS, n. *-nĕs*, or RECENCY, n. *rē′sĕn-sĭ*, late origin; lateness in time; freshness.—SYN. of 'recent': modern; new; novel; fresh; late.

RECENT or HUMAN PERIOD, in Geology: epoch since man appeared on the globe. The causes that operated throughout the ages of geological time to produce the changes recorded in the various sedimentary deposits have continued in activity ever since. The solid earth is being washed away by atmospheric agency, and the abraded portions are continually carried down slowly and imperceptibly by streams and rivers, to form new deposits in the depths of inland lakes or ocean. Volcanoes are throwing up lava and scoriæ, and earthquakes are elevating portions of the earth's surface in one place, and depressing them in another; and plants and animals are forming, as in past ages, deposits in various places, as in the foraminiferous ooze of the deep ocean, and the coral reefs of the eastern seas, or the peat-mosses and diatomaceous earths of temperate climes. The classification adopted for the subdivision of the Recent Period is based on what is supposed to have been the progress of human civilization. The first rude inhabitants of a country seem to have been acquainted only with stone implements. Their hammers, knives, and spears were made of stone, sharpened by chipping the edges, and subsequently by grinding and polishing. In Denmark, these stone implements are found buried in peat-mosses, associated with the remains of species of plants and animals still living in that or neighboring countries. The common tree in these mosses is the Scotch fir, which has not been a native of Denmark during historical times. Of the same age are the 'kitchen-middens,' found on the coasts of the Danish islands in the Baltic, also in n. Scotland. They are mounds of the shells of the oyster, cockle, periwinkle, and other edible mollusks, like those formed by the N. Amer. Indians on the e. coast of the United States. The implements found in them are of stone, sometimes of wood and bone, never of metal. The people who built the earliest of the lacustrine habitations of Switzerland also were unacquainted with the use of metals: see CRANNOGS. The paucity or almost absence of human bones in such early deposits, in Denmark or Switzerland, is attributed by antiquaries to the supposed practice of burning the dead.

While the lower portion of the Danish peat-mosses is characterized by stone implements and the trunks of Scotch fir, the upper portions of the same mosses abound in trunks and acorns of the common oak, and with these are associated implements and articles of bronze. In many of the Swiss pile-buildings also the bronze implements supplanted those of stone. The various articles show advance in civilization. In progress of time, the oak in its turn disappeared from the surface of Denmark, and was followed by the beech, which still flourishes luxuriantly in Denmark. The use of bronze also gradually gave way before the now discovered iron. A few of the lake-buildings seem not to have been abandoned until after the inhabitants became acquainted with the use of iron, as some articles made of this metal have been found at Nidau.

While it is useful thus to characterize the various steps in the civilization of man, and to associate them with the strata in which they occur, it would be a source of error to suppose that all such strata are contemporaneous; for the various ages have really existed at the same time not only in different countries of the world, but even in contiguous regions. In some instances, however, superimposed deposits containing successive remains of stone, of bronze, and of iron implements, have been found, as at Villeneuve, Switzerland: see ANTHROPOLOGY: BRONZE AGE OF. In N. America, no vestiges of a Bronze Age are found; iron was introduced by Europeans, since the discovery of America by Columbus; but there was an age, quite uncertain in date, when copper was much used by the mound-builders, and, by an unknown process, was hardened so that implements of it were used in mining the native copper of Lake Superior. Both chipped and polished stone implements abound, extending from very recent manufacture back to a time that is in dispute. Flint arrowheads have been reported as found with charcoal and bones of the mastodon in the Osage valley and elsewhere in Missouri. In Brazil human remains accompany extinct Quaternary animals. In the island of Guadaloupe, skeletons of Indians, killed in a battle two centuries ago have been found in a recently consolidated limestone.

RECEPTACLE, n. *rē-sép'tă-kl* [F. *réceptacle*; L. *receptac'ulum*, a magazine or storehouse—from *receptārĕ*, to take again—from *re*, back; *capĭō*, I take: Sp. *receptaculo*]: a place or vessel into which a thing is received, or in which it may be contained. In *botany*, R. is the expanded and abbreviated termination of a floral axis, bearing many flowers close together, as in the *heads of flowers* of the *Compositæ* and in the fig. The R. assumes great variety of forms, and sometimes, as in the fig, becomes a chief part of the fruit. It is the eatable part of the artichoke, and the 'cheese' of thistles, so well known to school children. The name R. is sometimes given also to that part of a single flower from which the

whorls of floral envelopes and parts of fructification, or some of them, spring; which is properly called the *thalamus* or *torus*. RECEPTACULAR, a. *rĕs-ĕp-tăk'ū-lĕr*, in *bot.*, pert. to the receptacle, or growing on it.

Receptacle:

a, a, a, receptacle: 1, hollow receptacle of matricaria: 2, dry receptacle of the raspberry, bearing fleshy ovaria: 3, succulent receptacle of the strawberry, bearing dry ovaria.

RECEPTION, n. *rĕ-sĕp'shŭn* [F. *réception*—from L. *receptiōnem*, a receiving—from *re*, back; *capiō*, I take]: the act or the power of receiving; state of being received; admission of anything sent or communicated; treatment at first coming; entertainment; a receiving officially; admission, as of an opinion or doctrine; in *OE.*, recovery. RECEP'TIBLE, a. *-tĭ-bl*, capable of being received; receivable. RECEP'TIBIL'ITY, n. *-tĭ-bĭl'ĭ-tĭ*, possibility of receiving or being received; the quality of being receptible; receivableness. RECEP'TIVE, a. *-tĭv*, having the quality of receiving or admitting what is communicated. RECEPTIVITY, n. *rĕ'sĕp-tĭv'ĭ-tĭ*, the state or quality of being receptive; the power or capacity of receiving, as the impressions of the external senses; in *phys.*, the force of vital resistance.—SYN. of 'reception': capacity; admission; readmission; credence; treatment; welcome; entertainment; receipt.

RECEPTION, RELIGIOUS, of Monks, Nuns, and Other Religious Persons: ceremonial of admission to the probationary state called Novitiate (q.v.). Before the R., a short preparatory stage must be passed through by the candidate (called at this stage a 'postulant,') lasting usually two to six months. The ceremony of the R., called also 'clothing,' is performed by a bishop, or a priest delegated by a bishop, and consists in blessing the religious dress or habit, and investing the postulant therein with appropriate prayers, the hair being at the same time cut off, and the secular dress laid aside, in token of the renunciation of the world and its pomps and pleasures. The R., however, is understood to be only a provisional step; and the novice remains free to return to secular life at any time during the novitiate.

RECESS, n. *rē-sĕs'* [L. *recessus*, a going back, a retreat —from *re*, back or again; *cedo*, I go or move: It. *recesso*]: a cavity in a wall made for use or ornament; suspension of business or procedure; the time or period during which public business is suspended; retreat; retirement; place of retirement; a secret part; an abstruse portion; a receding, as of the shore. RECES'SES, n. plu. *-sĕz*, in *bot.*, the bays or sinuses of lobed leaves. RECESSED, a. *rē-sĕst'*, having a recess or recesses. RECESSION, n. *rē-sĕsh'ŭn*, the act of receding or returning or giving back. RECES'SIONAL, a. *-al*, receding; done on returning, as a *recessional* hymn: see RECEDE.

Recessed Arch.

RECHABITES, n. plu. *rĕk'ā-bīts*, or SONS OF RECHAB: branch of the Kenites that came of Hemath, the father of the 'house of Rechab' (1 Chron. ii. 55), distinguished for their persistent abstinence, in obedience to the command of 'Jonadab the son of Rechab our father,' as they avowed (Jer. xxxv. 8). Of Rechab nothing is known, nor of Jonadab, except the mention of their names, and the command given by the latter. The Kenites (q.v.) were a small nomadic tribe repeatedly mentioned, friendly to the Israelites, in whose cities they lived at times when not wandering; they corresponded to the modern Bedouins and have been variously classified with neighboring nations. The R. embraced the religion of Israel, and, according to tradition, finally became incorporated with the Levites, having a part in the Temple service. For 2½ centuries at least they adhered to abstinence from wine, house-building, seed-sowing, vineyard-planting, and dwelt mostly in tents: their faithfulness to ancestral teaching is set forth in Jer. xxxv. Travellers in the 12th c., and as late as 1829 and 62, found tribes claiming to be descendants; but the claim is doubted. The name R. has been used by an association pledged to total abstinence from intoxicating drink.

RECHANGE, v. *rē-chānj'* [*re*, back or again, and *change*]: to change again.

RECHARGE, *rē-chärj'* [*re*, back or again, and *charge*]: to charge or accuse in return; to attack again.

RECHARTER, n. *rē-chär'tĕr* [*re*, back or again, and *charter*]; a new charter or contract: V. to grant a second or new charter to.

RECHEAT, n. *rē-chēt'*, or RECHATE, *rē-chāt'* [F. *requête*, a note of the chase to recall the dogs—from *requêter*, to hunt anew (see REQUEST)]: among *hunters*, a particular sounding on the horn to recall the hounds when they have lost the scent of the game: V. to sound the recall on the horn. RECHEAT'ING, imp. RECHEAT'ED, pp.

RECHERCHÉ, a. *rĕ-shĕr'shā* [F. *recherché*, well finished —from *rechercher*, to seek again]: nice to an extreme; out of the common; rare; exquisite.

RECHOOSE, v. *rē-chōōz'* [*re*, back or again, and *choose*]: to choose a second time.

RECIDIVATE, *rē-sĭd'ĭ-vāt* [L. *recidivus*, falling back—from *recido*, I fall back; *re*, back; *cado*, I fall: F. *récidiver*]: to fall back or again; to relapse; to backslide. RECIDIVA'TION, n. *-shŭn*, a falling back; a relapsing; a backsliding. RECID'IVIST, n. *-vĭst*, one who has been convicted a second time; one of the worst class of felons.

RECI'FE: see PERNAMBUCO.

RECIPE, n. *rĕs'ĭ-pē*, plu. REC'IPES, *-pēz* [L. *recipĕ*, take or receive—from *recipiō*, I receive or get back—from *re*, back; *capiō*, I take: F. *récipé*]: the first word of a medical prescription written in Latin; a physician's written directions to a patient as to what medicines he shall take; a formulary or prescription for making some combination or mixture of materials. *Note.*—It appears to be pretty well established, in the common usage of good society, that *receipt* should be restricted to acknowledgments for money, etc., received; and that the word *recipe* should be applied to any written directions for a mixture or preparation.

RECIPIENT, n. *rĕ-sĭp'ĭ-ĕnt* [F. *récipient*—from L. *recipĭens* or *recipien'tem*, receiving or getting back—from *re*, back or again; *capiō*, I take: It. *recipiente*]: the person or thing that receives; a receiver. RECIP'IENCE, n, *-ĕns*, or RECIP'IENCY, n. *-ĕn-sĭ*, the state or quality of being recipient; a receiving.

RECIP'ROCAL, in Mathematics: term designating an interchangeable relation, analogous to the sense attached to it in ordinary language. A geometrical proposition is the R. (or *inverse*) of another, when the 'data' of the one are the 'quæsita' of the other, and *vice versâ*. In algebra, one quantity is the R. of another, when the one is the result of unity divided by the other; thus, 2 and $\frac{1}{2}$, x and $\frac{1}{x}$, $\frac{a}{b}$ and $\left(1 \div \frac{a}{b}\right)$ or $\frac{b}{a}$, are reciprocal quantities. The product of a quantity by its R must always be unity. *Reciprocal or Inverse Proportion*, a term formerly much used in arithmetical treatises, but now generally disused, referred to such questions as the following: If a rectangular field be 800 yards long, and 240 broad, what must be the breadth of another rectangular field of equal area which is 960 yards long?—the answer being 200 yards.

RECIPROCATE, v. *rē-sip'rō-kāt* [L. *reciprocātus*, moved backward and forward, reciprocated—from *reciprōcus*, alternating, reciprocal: It. *reciprocare*: F. *réciproquer*]: to give and receive mutually; to interchange; to act alternately in any direction or manner. RECIP'ROCATING, imp.: ADJ., acting interchangeably; alternating. RECIP'ROCATED, pp. RECIP'ROCA'TION, n. *-kā'shŭn*, a mutual giving and returning: interchange; alternation. RECIPROCITY, n. *res-i-pros'i-ti* [F. *réciprocité*—from L. *reciprocitātem*]: interchange; equal mutual rights or benefits to be yielded or enjoyed; mutual action and reaction. RECIPROCAL, a. *rē-sip'rō-kăl*, alternate; mutually interchangeable: N. in *arith.*, the quotient resulting from the division of unity by any given number. RECIP'ROCALLY, ad. *-lĭ*. RECIP'ROCALNESS, n. *-nĕs*, the quality of being reciprocal; alternativeness. RECIPROCAL PROPORTION, in *arith.*, a proportion in which the first term has to the second the same ratio as the fourth to the third. RECIPROCATING MOTION, in *mech.*, motion alternately backward or forward, or up and down, as of a piston-rod. RECIPROCITY TREATY, a treaty between two countries which confers equal privileges, especially in trade.

RECIPROCITY, INTERNATIONAL: see TARIFF.

RECISION, n. *rē-sizh'ŭn* [L. *recisiōnem*, a cutting off—from *re*, back; *cædo*, I cut: It. *recisione*]: the act of cutting off.

RE-CITATION, n. *rē-si-tā'shŭn* [*re*, back or again, and *citation*]: a second citation.

RECITATIVE', in Music: form of song resembling declamation, differing from an air in having no definite rhythmical arrangement, and modelled or strictly constructed melody. Recitatives are not performed in any strict time, the length of the notes depending on the singer, who lengthens or shortens them according to the expression required. It is, however, usual to note a R. in common time, to facilitate the reading; and when any part of a R. is to be performed in strict time, this is indicated by the words *rec. a tempo*. When a R. is accompanied merely by a few simple chords of an instrument, to indicate to the singer the pitch and the harmony, it is called *recitativo secco* or *parlante*, i.e. declaimed R. When the voice is accompanied by a considerable portion of the instruments of the orchestra, either in sustained chords or florid passages, it is termed *recitativo accompagnato*, *strumentato*, or *obbligato*. R. was used largely in the ancient drama; and is frequent in the modern opera to express some action or passion, to relate a story, reveal a secret or design, etc. It is said to have been introduced in the opera by Emilio del Cavaliere at Rome.

RECITE, v. *rē-sīt'* [F. *réciter*—from L. *recĭtārĕ*, **to repeat** from memory—from *re*, back or again; *cito* I proclaim: It. *recitare*]: to repeat, as the words of another; to relate; to go over particulars; to rehearse or repeat, as a lesson from memory. RECI'TING, imp. RECI'TED, pp. RECI'TER, n. *-tĕr*, one who recites. RECI'TAL, n. *-tăl*, the repetition of the words of another; rehearsal from memory; narration. RECITATION, n. *rĕs'ī-tā'shŭn*, [F.—L.]: the delivery aloud, with appropriate gestures, before an audience, of a composition committed to memory; the composition or matter delivered or rehearsed. RECITATIVE, n. *rĕs'ī-tă-tēv'* [It. *recitativo*]: a kind of speaking, more musical than ordinary speech; words spoken in the sounds of the musical scale; a kind of half-singing and half-speaking the words of a written composition: ADJ. pert. to the musical pronunciation of words. RECITATIVO, a. *rĕs'ī-tă-tē'vō* [It.]: recitative—SYN. of 'recital': rehearsal; recitation; relation; detail; narrative; account; description; explanation;—of 'recite': to describe; recapitulate; rehearse; narrate; relate; detail; number.

RECK, v. *rĕk* [AS. *recan, reccan;* Low Ger. *rochen;* Dut. *roecken*, to reck, to care for: Icel. *rakja*, to care]: to regard; to heed; to care for. RECK'ING, imp. RECKED, pp. *rĕkt*. RECK'LESS, a. *-lĕs* [AS. *reccelaus*]: careless; heedless. RECK'LESSLY, ad. *-lī*. RECK'LESSNESS, n. *-nĕs*, the state or quality of being reckless; heedlessness; negligence.—SYN. of 'reckless': regardless; careless; heedless; mindless; thoughtless; negligent; indifferent; unconcerned; remiss.

RECKON, v. *rĕk'n* [AS. *recenian*, to explain: OH.G. *rachon*, to say or tell; Low Ger. *reken;* Ger. *rechnen*, to reckon]: to number; to compute; to set in the number or rank of; to regard; to esteem; to estimate; to think; to take into calculation; to be answerable for; to depend on. RECKONING, imp. *rĕk'n-ĭng:* N. a statement and comparison of accounts with another person; computation; an account of time; money charged for entertainment or refreshments; in *nav.*, the computation of a ship's way, usually by the log. RECKONED, pp. *rĕk'nd*. RECK'ONER, n. *nĕr*, he or that which reckons or computes. TO RECKON ON, to depend on; to lay stress or dependence on. TO RECKON WITH, to settle accounts with; to exact punishment. READY-RECKONER: see READY.—SYN. of 'reckon': to number; count; esteem; account; compute; calculate; enumerate; estimate; value; repute.

RECLAIM, v. *rē-klām'* [F. *réclamer*—from L. *reclamārĕ*, to cry out against—from *re*, back or again; *clāmō*, I call: It. *reclamare*]: to claim back; to bring back from error or vicious habits; to reduce from a wild or uncultivated state, as land; to recover or regain; to remonstrate; in *Scots law*, to appeal. RECLAIM'ING, imp. RECLAIMED, pp. *rē-klāmd'*. RECLAIMABLE, a. *rē-klām'ă-bl*, that may be brought from a wild state, or re-

formed. RECLAIM'ABLY, ad. *-blĭ*. RECLAMATION, n. *rĕk'lă-mā'shŭn* [F.—L.]: act of reclaiming; state of being reclaimed; claim made; remonstrance; recovery. RECLAIMING NOTE, in *Scots law*, a note of exceptions to the judgment of the lord ordinary by a dissatisfied party who appeals to a higher division of the same court.—SYN. of 'reclaim': to reform; correct; recall; tame; recover; amend; restore.

RECLINE, v. *rĕ-klīn'* [F. *récliner*—from L. *reclīnārĕ*, to bend back—from *re*, back; Gr. *klīnō*, I bend: It. *reclinare*]: to lean to one side; to lean back; to rest or repose: ADJ. in *OE.*, having a leaning posture. RECLINING, imp. RECLINED, pp. *rĕ-klīnd'*. RECLINATE, a. *rĕ-klī'nāt* [L. *reclīnātus*, reclined]: in *bot.*, curved downward from the horizontal; bent down on some other part; applied to leaves which are folded longitudinally from apex to base in the bud. RECLINATION, n. *rĕk'lĭ-nā'shŭn*, the act of leaning; a leaning: in *surg.*, an operation for the cure of cataract; in *dialling*, the angle which the plane of a dial makes with a vertical plane.

RECLOSE, v. *rē-klōz'* [*re*, back or again, and *close*]: to close again.

RECLUS, *rĕh-klŭ'*. JEAN JACQUES ÉLISÉE: French geographer and traveller: b. Sainte Foy la Grande, dept. Gironde, 1830, Mar. 15; son of a Prot. pastor. He studied with the father of modern geog., Carl Ritter. Having opposed the *coup d'état* of 1851, he was forced to leave France, and until 1857 he travelled extensively; returning, he published much of his observations and became ed. of the *Revue des Deux Mondes*. During the American civil war, he defended the cause of the Union, and it is said (in Larousse's *Dict. Univ.*) that he declined remuneration from the American minister; any offer of the kind is improbable. In the Franco-Prussian war, he was active in the military-aëronautic service. On account of his connection with the communistic revolution of 1871, he was condemned to transportation, but the sentence, against which Darwin and other men of science remonstrated, was soon made a temporary banishment. He is, by universal consent, a man of noble nature as well as much ability. Besides numerous essays, guide books, and travels, he has published 'a little *chef d'œuvre*'—*Histoire d'un Ruisseau*; *La Terre* (1867–8), and *Les Phénomènes terrestres, les mers, et les météores* (1872), both very comprehensive, and translated into English, the latter entitled *The Ocean, the Atmosphere, and Life*; *Nouvelle Géographie Universelle* beginning 1875; and *Histoire d'une Montagne* (1880). Among his guide books, issued in 'the sixties,' are those to London, to the Exposition of 1862, and to winter resorts on the Mediterranean.

RECLUSE, n. *rĕ-klōs'* [F. *reclus ;* Sp. *recluso*—from L. *re,* back or again; *clausus,* shut—from *claudo,* I shut]: one who lives in retirement or seclusion from the world, as a hermit or monk; a religious devotee who lived in one of a series of isolated cells, usually attached to a monastery; an anchorite. Such monks or nuns, from a motive of special penance, or for attainment of Christian perfection, remained shut up from all converse even with members of their own order, in a cell or other place of strict retirement. This practice was allowed only to persons of tried virtue, and by special permission of the abbot; and the R. was, with due solemnity, locked up in the presence of the abbot or the bishop, who placed his seal upon the door, not to be removed without the authority of the bishop himself. The celebrated mediæval theologian, Rabanus Maurus, was a R. when elected Abp. of Mentz. Nuns also were found to practice the same voluntary seclusion, especially in the Benedictine, Franciscan, and Cistercian orders. A rule specially designed for female recluses was composed by Ælred of Reresby, and is preserved by Holstenius in *Codex Regularum Monasticarum,* I. 418, and following.—In a wider sense, the name R. is popularly applied to all cloistered persons, whether men or women, even those who live in community with their brethren. RECLUSE, a. retired from the world or from public notice; sequestered; solitary; secluded; retired. RECLUSE'LY, ad. *-lĭ.* RECLUSE'NESS, n. *-nĕs,* retirement from society. RECLU'SION, n. *-zhŭn* [F.—L.]: religious retirement; the life of a recluse. RECLU'SIVE, a. *-sĭv,* affording retirement or seclusion.

RECOGNIZE, v. *rĕk'ŏg-nīz* [OF. *recognoistre,* to recognize—from L. *recognos'cĕrĕ,* to know again, to recall to mind—from *re,* again; *cognosco,* I know: It. *ricognoscere :* F. *reconaître*]: to know again; to recollect or recover the knowledge of; to avow; to admit with a formal acknowledgment. REC'OGNIZING, imp. REC'OGNIZED, pp. *-nīzd.* REC'OGNIZER, n. *-nī'zĕr,* one who recognizes. REC'OGNIZABLE, a. *-zā-bl,* that may be known again. REC'OGNIZABLY, ad. *-blĭ.* RECOGNIZANCE, n. *rĕ-kŏg'nĭ-zăns* or *rĕ-kŏn'ĭ-zăns,* an acknowledgment of a person or thing: in *law,* an obligation of record which an individual enters into before a court of record, or before a magistrate duly authorized, with condition to do some particular act, as to appear before the court again, or to keep the peace: the verdict of a jury upon assize. RECOGNIZEE, n. *rĕ-kŏg'nĭ-zē'* or *rĕ-kŏn'ĭ-zē,* one to whom a recognizance is made. RECOG'NIZOR, n. *-zŏr,* one who enters into a recognizance. RECOGNITION, n. *rĕk'ŏg-nĭsh'ŭn* [L. *recognĭtĭōnem*—from *recognĭtus,* known again]: renewed or revived knowledge; knowledge confessed or avowed; notice taken. RECOGNITOR, n. *rĕ-kŏg'nĭ-tŏr,* one of a jury upon an assize. RECOG'NITORY, a. *-tĕr-ĭ,* pert. to or containing recognition.—SYN. of 'recognize': to acknowledge; own; allow; concede; avow, confess.

RECOIL, n. *rē-koyl'* [F. *reculer*, to draw back—from *cul*, the rump: L. *re*, back; *culus*; It. *culo*, the posteriors: comp. Gael. *cul*; W. *cil*, the back: formerly written *recule* or *recuile*]: a starting or springing back; a rebound, particularly of firearms (see below); V. to rebound; to move backward suddenly, as a firearm does on discharge; to fall back; to move or start back; to shrink or revolt, as from anything disgusting. RECOIL'ING, imp.: N. act of shrinking back; revolt. RECOILED', pp. *-koyld'*. RECOIL'ER, n. *-ér*, one who recoils. RECOIL'MENT, n. *-mĕnt*, the act of recoiling. RECOIL'INGLY, ad. *-lĭ*.

RECOIL', in Gunnery: backward movement after discharge. When the charge contained in a gun is fired, the sudden expansion of the powder into many times its former bulk acts with equal force in every direction. The resistance offered by the ball, which moves more or less easily in the bore, being far less than that of the bulky and heavier gun and carriage, the ball is forced to a great distance; but the gun, with its carriage, must nevertheless feel the reaction, and is driven backward a certain space, ordinarily a few feet. From this recoil dangerous accidents sometimes take place. After the R. the gunners have to work the piece back to its former position for the next discharge. In some modern cannon, the trunnions of the gun are mounted on an inclined plane, up which the recoil drives them, to run down again by their own weight. Other expedients have been tried with greater or less success; among them a series of solid India-rubber buffers, which, being compressed by the recoil, drive the gun home again on recovering their shape. The gun and shot remaining the same, the recoil is proportionate to the charge.

The recoil of small-arms is known as their 'kick,' and is felt on the shoulder of the marksman.

RECOIN, v. *rē-koyn'* [*re*, back or again, and *coin*]: to coin again. RECOIN'AGE, n. *-āj*, the act of recoining; that which is coined anew.

RECOLLECT, v. *rĕk'ŏl-lĕkt'* [L. *re*, back or again; *collectus*, gathered together (see COLLECT)]: to bring back to the mind or memory; to call to mind; to remember; to recover composure or resolution of mind after temporary confusion or surprise. REC'OLLECT'ING, imp. REC'OLLECT'ED, pp. REC'OLLEC'TION, n. *-lĕk'shŭn*, the act and the power of recalling to the memory; the operation by which things of the past are recalled to the memory or revived in the mind; period within which things can be recalled to the mind. REC'OLLECT'IVE, a. *-lĕkt'ĭv*, having the power of recollecting.—SYN. of 'recollection': memory; reminiscence; remembrance.

RE-COLLECT, v. *rē'kŏl-lĕkt'* [*re*, again, and *collect*]: to gather again what has been scattered.

RECOLLECT: see under RECOLLET.

RECOLLET, n. *rĕk'ŏl-lĕt*, or REC'OLLECT, *-lĕkt* [F. *récollet*—from L. *re*, back; *collectus*, gathered]: monk or nun of certain reformed monastic orders in the Rom. Cath. Church—so called because they *recollected* the rules of their order. Among orders of men, an offshoot of the Augustinian hermits, which, under Louis de Montaya 1530, obtained considerable popularity in Spain, was called by this name; and the order still exists at Medina Sidonia, Leon, and Pamplona; but outside of Spain, this order is better known under the title REFORMED FRANCISCANS, who were established in France under Henry IV. and Louis XIV., and spread thence into Belgium, their houses in these countries and Germany becoming so numerous that they reckoned no less than ten provinces. A reform of the Cistercian order of nuns in Spain was called by the same name.

RECOLONIZE, v. *rē-kŏl'ŏ-nīz* [*re*, again, and *colonize*]: to colonize anew.

RECOMBINE, v. *rē'kŏm-bīn'* [*re*, again, and *combine*]: to combine again.

RECOMFORT, v. *rē-kŭm'fĕrt* [*re*, and *comfort*]: to comfort or console again; to give new strength to. RECOM'FORTLESS, a. in *OE.*, without comfort.

RECOMMENCE, v. *rē'kŏm-mĕns'* [*re*, again, and *commence*]: to begin anew.

RECOMMEND, v. *rĕk'ŏm-mĕnd'* [*re*, again, and *commend*]: to praise or commend to another; to introduce to another's notice as worthy of some kindness or advancement; to advise to some particular course or act. REC'OMMEND'ING, imp. REC'OMMEND'ED, pp. REC'OMMEND'ER, n. *-ĕr*, one who recommends. REC'OMMEND'ABLE, a. *-ă-bl*, worthy of commendation or praise. REC'OMMENDA'TION, n. *-mĕn-dā'shŭn*, the act of representing in a favorable manner for the purpose of procuring the good-will and confidence of another; anything which secures a kind or favorable reception. REC'OMMEN'DATORY, a. *-dă-tĕr-ĭ*, that commends to another.

RECOMMISSION, n. *rē'kŏm-mĭsh'ŭn* [*re*, again, and *commission* (see COMMIT)]: a new commission.

RECOMMIT, v. *rē'kŏm-mĭt'* [*re*, again, and *commit*]: to commit again, as to prison; to refer again to a committee. RE'COMMIT'TING, imp. RE'COMMIT'TED, pp. RE'COMMIT'TAL, n. *-ăl*, or RE'COMMIT'MENT, n. *-mĕnt*, the act of giving back into keeping; a renewed reference to a committee.

RECOMPACT, v. *rē'kŏm-păkt'* [*re*, again, and *compact*]: to join anew.

RECOMPENSE, v. *rĕk-ŏm-pĕns'* [F. *récompenser*, to reward—from L. *re*, again; *compensārĕ*, to weigh together, to compensate—from *con*, together; *pensārĕ*, to weigh out; *pendĕrĕ*, to weigh: It. *ricompensare*]: to reward; to return an equivalent for some service; to remunerate; to repay or requite; in *OE.*, to redeem: N. the equivalent returned for anything given or done; compensation. REC'OMPENSING, imp. *-pĕn-sing*. REC'OMPENSED, pp. *-pĕnst*.—SYN. of 'recompense, n.': compensation; repayment; remuneration; satisfaction; amends; requital; reward.

RECOMPILE, v. *rē'kŏm-pīl'* [*re*, again, and *compile*]: to compile or digest anew. RECOMPILATION, n. *rē-kŏm'-pĭl-ā'shŭn*, a new compilation of what had been compiled before.

RECOMPOSE, v. *rē'kŏm-pōz'* [*re*, again, and *compose*]: to compose or tranquillize anew; to form or adjust again. RE'COMPO'SING, imp. RE'COMPOSED', pp. *-pōzd'*. RECOMPOSITION, n. *rē'kŏm-pō-zĭsh'ŭn*, a new composition of matter that had previously been composed.

RECONCILE, v. *rĕk'ŏn-sīl* [F. *réconcilier*—from L. *reconciliārĕ*, to reunite—from *re*, again; *conciliō*, I unite, I make friendly: It. *riconciliare*]: to reunite in friendship and good-will after estrangement; to restore to favor; to content; to bring to quiet submission; to bring to agreement seeming contradictions; to make consistent; to adjust; to compose, as differences; in *OE.*, to re-establish. REC'ONCILING, imp. REC'ONCILED, pp. *-sīld*. REC'ONCI'LER, n. *-sī lĕr*, one who reconciles. REC'ONCILABLE, a. *-ă-bl* [F.]: capable of renewed kindness; that may be made to agree or be consistent. REC'ONCILABLY, ad. *-blĭ*. REC'ONCILABLENESS, n. *-ă-bl-nĕs*, the quality of being reconcilable; the possibility of being restored to friendship. REC'ONCILEMENT, n. *-mĕnt*, renewal of friendship; favor restored. REC'ONCILIA'TION, n. *-sĭl-ĭ-ā'shŭn* [F.—L]: renewal of friendship after disagreement or enmity; agreement of things apparently contradictory or inconsistent; in *Scrip.*, the divine method of bringing sinners into a state of favor with the Creator by Christ Jesus. REC'ONCIL'IATORY, a. *-sĭl'ĭ-ă-tĕr-ĭ*, able or tending to reconcile.—SYN. of 'reconcile': to conciliate; propitiate; pacify; appease; reunite;—of 'reconciliation': reunion; pacification; reconcilement; appeasement; propitiation; expiation; atonement.

RECONDENSE, v. *rē'kŏn-dĕns'* [*re*, again, and *condense*]: to condense again.

RECONDITE, a. *rĕk'ŏn-dīt* or *rē-kŏn'dīt* [L. *reconditus*, hidden, concealed—from *re*, back; *condo*, I conceal: It. *recondito*]: secret; hidden from the view or intellect; abstruse.

RECONDUCT, v. *rē'kŏn-dŭkt'* [*re*, back or again, and *conduct*]: to conduct back or again.

RECONFIRM, v. *rē'kŏn-fĕrm'*: to confirm anew.

RECONNAISSANCE, n., or RECONNOISSANCE, n. *rē-kŏn'-nĭs-sāns* [F. *reconnaissance*—from F. *re*, again; *connaître*; OF. *conoistre*—from L. *cognoscĕrĕ*, to know]: operation of inspecting a country in which military operations are intended. This duty devolves on the dept. of the quartermaster-gen., and requires the exercise of qualities of a very high order. The officer deputed to reconnoitre is well mounted, and accompanied by a small escort, also well mounted, in order to escape if noticed by the enemy. His duty is to measure every natural feature in his district by eye, or by more accurate measurement when practicable, and to produce a map, showing hills, valleys, streams, canals, plains, woods, etc. He must at the same time note all obstacles; what resources the country possesses to maintain men or horses; what the disposition of the inhabitants, etc. Reconnoitering is necessarily a very dangerous service; an officer so employed has often to resort to disguises, and if taken, runs some risk of being treated as a spy.—A maritime reconnaissance is analogous. RECONNAISSANCE IN FORCE, demonstration or attack with a large body of troops for the purpose of discovering the position and strength of the enemy.

RECONNOITER, or RECONNOITRE, v. *rĕk'ŏn-noy'tĕr* [OF. *reconoistre*; F. *reconnaître*, to observe—from L. *recognoscĕrĕ*, to know again (see preceding entry)]: to view; to survey—particularly to examine an enemy's position and movements, and the state of his army or camp; to examine or survey the line of country intended for military operations (see RECONNAISSANCE); to examine for scientific purposes. RECONNOI'TERING, or REC'ONNOI'TRING, imp. *-trĭng*. RECONNOI'TERED or RECONNOI'TRED, pp. *-tĕrd*.

RECONQUER, v. *rē-kŏng'kĕr* [*re*, again, and *conquer*]: to recover by conquest. RECON'QUEST, n. *-kwĕst* [*re*, again, and *conquest*]: a second conquest.

RECONSECRATE, v. *rē-kŏn'sĕ-krāt* [*re*, again, and *consecrate*]: to consecrate anew.

RECONSIDER, v. *rē'kŏn-sĭd'ĕr*, [*re*, again, and *consider*]: to turn over in the mind again; to take up for consideration again that which has already been settled, as a vote, a motion, etc. RE'CONSID'ERA'TION, n. *-ā'shŭn*, renewed consideration or review.

RECONSTRUCT, v. *rē-kŏn-strŭkt'* [*re*, again, and *construct*]: to construct anew; to rebuild. RE'CONSTRUC'TION, n. *-strŭk'shŭn*, the act of constructing again. RE'CONSTRUC'TIVE, a. *-tĭv*, able or tending to reconstruct; reconstructing.

RECONSTRUCTION IN THE UNITED STATES: see UNITED STATES OF AMERICA.

RECONVENE, v. *rē'kŏn-vēn'* [*re*, again, and *convene*]: to call together again; to assemble or come together again.

RECONVERSION, n. *rē'kŏn-vĕr'shŭn* [*re*, again, and *conversion*]: a second conversion.

RECONVERT, v. *rē'kŏn-vĕrt'* [*re*, again, and *convert*]: to convert again.

RECONVEY, v. *rē'kŏn-vā'* [*re*, back or again, and *convey*]: to convey back; to transfer back to a former owner. RE'CONVEY'ANCE, n. *-vā'ăns*, the act of transferring back to a former proprietor.

RECORD, n. *rĕk'ŏrd* [F. *recorder*, to get by heart—from L. *recordāri*, to be mindful of a thing, to remember—from *re*, back or again; *cor*, the heart: It. *ricordare*]: a register; an authentic or official copy of any facts and proceedings which have been entered into a book for preservation; the book containing these (see RECORDS, PUBLIC): V. *rē-kwŏrd'*, to write or register any facts or proceedings in a book for the purpose of preserving authentic evidence of them; to cause to be remembered; to imprint deeply on the mind or memory; in *OE.*, to celebrate; to recite; to repeat; to call to mind; to sing or play a tune. RECORD'ING, imp. RECORD'ED, pp. RECORD'ER, n. *-ĕr*, one whose duty it is to enroll or write in a book facts and particulars of transactions for preservation; in *England*, the chief judicial officer of a city or borough, so called from his court being a court of record (see below): a registrar: ancient kind of flageolet, formerly used in England, with the lower part wider than the upper, and a mouthpiece resembling the beak of a bird. Its pitch was an octave higher than the flute, and it had a pleasing tone, hence Milton speaks of

> The Dorian mood
> Of flutes and soft recorders.

RECORD'ERSHIP n. office of a recorder. *Note.*—The noun *record* in legal pronunciation in England is *rē-kwŏrd'*.

REC'ORD, in Law: history of all the material proceedings in a suit: it is made up of the original writ or summons, all the pleadings, and the other important papers in the action; issues of law and not issues of fact are raised by the R., and these are decided by the court after hearing argument on the R. without listening to any evidence, and not by a jury. A trial by R. took place when one party pleaded a matter of R. and the other party denied that such R. or decision was in existence or pleaded '*nul tiel* record' as it was called; and the conflict was settled by bringing the R. into court. This form of action no longer exists in the United States. The records in the suits are generally filed in the courts, and such courts are called Courts of Record, having a clerk and a seal. The records of the court are of such high authority that they cannot be impeached except for fraud, or when it can be shown that the court did not obtain jurisdiction over the persons or the subject matter of the action.

RECORDATION, n. *rĕk'ŏr-dā'shŭn* [F. *recordāri*, to be mindful: see RECORD]: in *OE.*, remembrance.

RECORDE, *rĕk'ĕrd*, ROBERT, M.D.: generally allowed to have been the greatest English mathematician of the 16th c., but now almost forgotten: about 1500–1558; b. Tenby, Pembrokeshire, Wales. He completed his education at Oxford, distinguishing himself in mathematics, rhetoric, music, and anatomy; but wishing to make medicine his profession, he removed to Cambridge, where 1545 he received the degree M.D. In 1547, he was in London, and about that time was appointed family physician to Edward VI., and afterward to Queen Mary. Ten years after this, he was in the debtors' prison in London, where he died 1558. His works are in the form of dialogues between a master and his pupil, and are in the rude English of his time: among them are: *The Ground of Arts, teaching the Perfect Work and Practice of Arithmetic*, etc. (Lond. 1549), arithmetical work frequently reprinted; *The Pathway to Knowledge* (Lond. 1551), abridgment of Euclid's *Elements*; *The Castle of Knowledge, containing the Explication of the Sphere both Celestial and Material*, etc. (Lond. 1551), astronomical work, dedicated to Queen Mary, in which he compares the Ptolemaic and Copernican systems, and with great hesitation, gives preference to the latter; *The Whetstone of Wit, which is the second part of Arithmetic*, a treatise on algebra, a subject at that time little known, in which R. collects the substance of the best continental writers, and adds his own improvements and discoveries. In appreciation of the general results derivable from algebraic formulæ, he is far beyond his contemporaries, with the sole exception of Vieta (q.v.). R. is regarded as the inventor of the symbol (=) for equality, and of the mode of extracting the square root of compound quantities.

RECORD'ER, in England: a judge of a city or borough court of quarter sessions, appointed by the home sec.; having duties the same as usually pertain to courts of quarter sessions. The R. is not prohibited from practicing at the bar. In the United States, R. is not a usual title for judges; though in New York one of the judges of the court of general sessions of the peace is termed R. His office is elective, and during its term he does not practice law.

REC'ORD OF CONVEY'ANCES: official records required in all the states to be made at full length, of all conveyances of land, either in the office of the clerk of the county where the land is situated, or in what is known as the register's office. The statutes requiring these records are known as Recording Acts; and their purpose is to apprise subsequent purchasers or incumbrancers of the property, of the existence of the prior deeds of conveyances and of their contents; the due recording of a conveyance is by these 'acts' made constructive notice to all subsequent purchasers or in-

cumbrancers; and unless a conveyance is so duly recorded it is void as against a subsequent purchaser or incumbrancer in good faith who has no notice of the existence of such conveyance and whose deed is first duly recorded. In some states an unrecorded deed is fraudulent and void as against all creditors of the grantor and as against subsequent purchasers or incumbrancers for value without notice, even though their deeds be not recorded; but it is generally valid as against the grantor, his heirs and devisees, or against all persons having actual notice of it; in only one of the states is an unrecorded deed void as between the parties. Recorded deeds, other things being equal, take priority according to the time of record; and a deed is deemed recorded in most of the states from the time it is filed for record; i.e., from the time the minute is made on the deed, index, or entry-book by the register or county clerk: this minute consists of the day, the hour, and the minute of filing. Records of all deeds must be entered alphabetically in two indexes, one under the grantors' names, the other under the grantees' names; separate indexes and record books are kept for conveyances and mortgages. Commonly after record, the deed is delivered to the person entitled to it. In nearly all the states, in order that a deed may be recorded, a certificate of acknowledgment, before a proper officer, of its due execution is necessary; or else its execution must be proved by an attesting witness and the proof must be properly certified to by a proper officer; in addition to this, a seal of the grantor is generally necessary. Generally all deeds of real estate, mortgages, contracts relating to and affecting real estate, may be recorded. A duly recorded conveyance or instrument or a certified copy thereof may be read in evidence without further proof. If the land is situated in several counties, the deed or a certified copy thereof ought to be recorded in each of the counties. See REGISTRATION.

RECORDS, PUBLIC: contemporary authenticated statements of the proceedings of the legislature, and the judgments of those higher courts of law which are distinguished as Courts of Record. It has been a subject of much discussion what constitutes a record; and in a loose sense the term record has sometimes been applied to any public document preserved in a recognized repository.

No country is so rich in public records as England. The oldest existing English records are Tallies in Exchequer, which, till 1834, continued to be used both for receipts and for simple records of matters of account. They were wooden rods, marked on one side with notches to indicate the sum for which the tally was an acknowledgment; while on the two other sides were written the amount, the name of the payer, and the date of the transaction; and the tally being divided longitudinally, the one half was preserved in exchequer, and the other

given to the person who had paid the money. This rude contrivance, which came down from Anglo-Saxon times, was an effectual safeguard against forgery. Parchment is the material on which the greater portion of the records are written; the skins being, in some cases, as in the rolls of the exchequer and common law courts, attached at the top bookways; in other cases, as the chancery and wardrobe, sewed consecutively. Some records are in the form of books, as *Domesday;* others are filed—i.e., each document is pierced with a string or gut passed through it, the whole being fastened together in bundles. A few records are written on paper. The early parliamentary records and statutes are principally in Norman-French, which continued in partial use till the time of Henry V.; all the other great series of records, except those of parliament, are in Latin till the reign of George II., or later, except during the Commonwealth, when English was used.

Public records, which can be traced in germ before the Conquest, gradually expanded under the Norman and Plantagenet kings. They enabled the subject to defend and maintain those feudal rights and privileges which were gradually trenching on royal prerogative, and to protect himself from arbitrary exactions; while to the king they furnished precedents which could not be questioned for his calls of military service and taxation.

Their earliest receptacles were royal palaces in various parts of England; later 'treasuries,' or places of custody for the records of the different courts, were appointed at Westminster. A portion of the public records were, as far back as Henry III.'s reign, deposited in the Tower of London and New Temple; and in the reign of Edward III. the Tower had become a permanent treasury. The parliamentary committee 1837 enumerated among the places of deposit a room in the Tower over a gunpowder magazine, and contiguous to a steam-engine in daily operation; a chapel at the Rolls, where divine service was performed; underground vaults at Somerset House; damp and dark cellars at Westminster Hall; the stables of the late Carlton Ride; and the Chapter-house, Westminster. From the reign of Edward II. the attention of parliament had often been called to the safe custody and arrangement of the records as an object of solicitude; and general regulation and reform were effected 1800–35. The master of the rolls was restored to his original authority as custodian; and the plan involved the gathering of all the records in the large receptacle near Fetter Lane, into which, under Sir John Romilly, then master of the rolls, they began to be collected from their scattered depositories.

Space allows enumeration of only a few even of the more important classes of records. One class consists of the various territorial surveys, beginning with *Domesday* (q.v.), and including, among others, the *Rotuli Hundredorum, Extenta Manerii, Testa de Nevill, Pope Nicholas's Taxation, Henry VIII.'s Survey,* and the *Survey of*

the Commonwealth. Another extensive class belong to the *Exchequer*, including the *Pipe Roll*, or Great Roll of the Exchequer, beginning with the second year of Henry II., containing the yearly accounts of the revenues of the crown, certain and casual; the *Memoranda* and *Originalia* rolls, records of *First-fruits and Tenths*, records of the *Court of Augmentations*, instituted to decide questions regarding possessions belonging to the crown, on the dissolution of the monasteries, and *Placita*, or records of pleadings and judgments. The *Rotuli Curiæ Regis* contain the record of the proceedings in the ancient supreme court of law; and there are numerous classes of records of the proceedings in all the various courts of common law and in the court of chancery. The record of *Fines and Recoveries* is an unbroken record of the transfer of lands from 25 Henry II. to 1833, when this species of conveyance was abolished. The *Charter Rolls* are records of charters, of grants of privileges to religious houses, towns, and corporations, and creations of nobility from 11 Edward II. to Edward IV. The *Patent Rolls* are enrolments of instruments written on open (*patentes*) sheets of parchment, having pendent from them the Great Seal, addressed to the liege in general. The *Close Rolls* are records of such letters under the Great Seal as were dispatched closed or sealed up—royal mandates to particular persons for particular purposes, and not intended for public inspection. The *Liberate Rolls* contain writs issued out of chancery, ordering the payment of money from the treasury. The *Fine Rolls* contain accounts of fines paid to the king for license to alienate lands, freedom from knight-service, passing or renewal of charters, ward-ships, safe-conduct, pardons, etc. The *French Rolls*, *Norman Rolls*, and *Gascon Rolls* relate to the affairs of France, Normandy, and Gascony, when held by the English; and the *Rotuli Scotiæ* to transactions with Scotland. An important class of the records are those connected with parliament, including *Statute Rolls*, *Parliament Rolls*, *Records of Parliament*, and *Statutes* from 1485 to the present time, with the *Journals of the Lords and Commons* from Henry VIII. to the present time, and the *Writs of Summonses* and returns to parliament.

The *state papers* originally sprang from the privy council and chancery, and include the correspondence of the privy council, secretaries of state, and other public departments, with miscellaneous domestic papers from the time of Henry VIII. to George II., a mass of correspondence with foreign powers, and an extensive collection relating to ecclesiastical affairs at and after the Reformation. Since 1855 the State Paper Office has become a part of the Public Record Office, and been placed under the control of the master of the rolls. Much has been done in the way of calendaring and arranging the contents of this valuable repository, and several volumes of calendars of state papers are being issued yearly to the public.

By the regulations established by the master of the rolls, persons desirous of consulting the public records, including state papers, for a literary purpose, have to apply in writing to the deputy-keeper, stating the objects of their search, which, if necessary, may be more fully explained at a personal interview. If the explanation be satisfactory, a permission is issued to inspect and make extracts without payment of fees.

RECOUNT, v. *rē-kownt'* [F. *raconter*, to relate, to narrate: L. *re*, again; *compŭtō*, I sum up, I reckon—from *con*, together; *puto*, I reckon]: to go over in particulars; to tell distinctly; to narrate; to describe. RECOUNT'ING, imp. RECOUNT'ED, pp. RECOUNT'MENT, n. in *OE.*, relation; recital.

RE-COUNT, v. *rē-kownt'* [*re*, again, and *count*]: to count or reckon over again.

RECOUP, v. *rē-kōp'* [F. *recoupe*, a chip; *recouper*, to cut again—from *re*, again; *coup*, a blow, a stroke]: to diminish a claim for damages by keeping back a part; to make good. TO RECOUP ONE'S SELF, to reimburse or indemnify one's self for loss.

RECOUPMENT, *rē-kōp'mĕnt*, in Law: right of a defendant to meet the claim of the plaintiff in an action, or to reduce the amount of damages asked for by the plaintiff, by alleging a claim against the plaintiff growing out of the same transaction on which the plaintiff grounds his cause of action; it can be pleaded only in those cases in which the contract, for a breach of which the plaintiff sues, lays mutual duties and obligations on the two parties, and the one seeking remedy for the breach of duty by another is answered by the other making a claim against him for a breach of duty.—The word was used formerly to signify a right of deduction from the amount of plaintiff's claim, either from part payment or from defective performance or from any analogous fact; this, however, is old law; a distinction is now made between R., reduction, and set-off; these are analogous defenses, but have a distinct meaning: in R. the two claims must grow out of the same transaction; in reduction the defendant uses a claim growing out of the same transaction to cut down the amount of damages, but on which he could commence no action against the plaintiff, but could only reduce; in set-off, the opposing claims are entirely distinct and have no relation to each other.

RECOURSE, n. *rē-kōrs'* [F. *recours*, recourse, resort—from L. *recursus*, a retreat—from *re*, back; *cursus*, a running; *currĕrĕ*, to run: It. *ricorso*]: a going to with a request or application; resort; application of efforts, labor, or art to a certain purpose; in *OE.*, access.

RECOVER, v. *rē-kŭv'ėr* [F. *recouvrer*, to recover—from L. *recuperārĕ*, to get or obtain again—from *re*, again; *capiō*, I take: It. *ricoverare*, to recover, to retrieve]: to get or obtain again; to get or regain that which was lost; to restore, as from sickness; to revive; to rescue or release, as in II Tim. ii. 26; to bring back to a former state or condition, generally implying a better one; to grow well: in *law*, to obtain title to by judgment of a court; in *OE.*, to attain; to reach; to come up to. RECOV'ERING, imp. RECOV'ERED, pp. *-ėrd*. RECOV'ERER, n. *-ėr-ėr*, one who recovers. RECOV'ERABLE, a. *-ă-bl*, that may be regained; that may be brought back to a former state or condition. RECOV'ERABLENESS, n. *-ă-bl-nĕs*, the state of being recoverable; capability of being recovered. RECOV'EREE', n. *-ėr-ē*, the person against whom a judgment is obtained in common *recovery*—the person who obtains it is called the *recoverer*. RECOV'ERY, n. *-ėr-ĭ*, the act of regaining; the obtaining possession of anything lost; restoration from sickness; in *law*, the obtaining a right to something from an opposing party by the judgment of a court. RECOVERIES AND FINES, proceedings in law by which persons were enabled to bar estates tail; the act of cutting off an entail.—SYN. of 'recover': to repossess; resume; retrieve; recruit; heal; cure; regain.

RECREANT, a. *rĕk'rē-ănt* [OF. *recreant*, faint-hearted—from *recroire*, to give up, to yield, as in a combat: mid. L. *recredĕrĕ*, to yield—from *re*, back or again; *credĕrĕ*, to believe]: cowardly; mean-spirited; craven; false; apostate: N. a mean-spirited creature; a coward. REC'REANTLY, ad. *-lĭ*. REC'REANCY, n. *-ăn-sĭ*, mean-spiritedness.

RECREATE, v. *rĕk'rē-āt* [L. *recrĕātus*, made or created anew—from *re*, again; *crĕō*, I make: It. *recreare*: F. *récréer*]: to revive or refresh after toil, as the spirits or strength; to amuse; to entertain; to cheer; to afford pleasurable occupation to weariness, or in depression of spirits; to enliven. REC'REATING, imp. REC'REATED, pp. RECREATION, n. *rĕk'rē-ā'shŭn*, refreshment of the strength or spirits; amusement; diversion. REC'REATIVE, a. *-ā-tĭv*, enlivening after weariness of body or mind; amusing; diverting. REC'REA'TIVELY, ad. *-lĭ*. REC'REA'TIVENESS, n. *-ā'tĭv-nĕs*, the quality of being recreating or diverting.—SYN. of 'recreate': to refresh; amuse; divert; delight; gratify; relieve; revive; reanimate; cheer;—of 'recreation': amusement; pastime; sport; diversion; entertainment.

RE-CREATE, v. *rē-krē-āt'* [*re*, again, and *create*]: to create anew.

REC'REATIVE RELIGIONISTS, : an association formed in London, 1866, Dec., for giving popular scientific lectures on Sunday evenings, sacred music being performed at intervals.

RECREMENT, n. *rĕk'rē-mĕnt* [L. *recremen'tum*, the thing sifted away, refuse—from *re*, back or again; *cerno*, I separate: It. *recremento:* F. *récrément*]: useless parts separated or thrown off; refuse; dross; in *physiol.*, a humor which, after having been separated from the blood by an organ of secretion, is absorbed into it again. The saliva is a case in point. REC'REMENT'AL, a. *-mĕnt'ăl*, REC'REMENTI'TIAL, a. *-mĕn'tĭsh'ăl*, or REC'REMENTI'TIOUS, a. *-tĭsh'ŭs*, drossy; consisting of useless matter separated from that which is valuable.

RECRIMINATE, v. *rē-krĭm'ĭ-nāt* [F. *récriminer*, to recriminate—from L. *re*, back or again; *criminor*, I accuse one of a crime; *crimĭnātus*, accused of crime—from *crimen*, an accusation: It. *recriminare*]: to return one accusation for another; to accuse in return. RECRIM'INATING, imp. RECRIM'INATED, pp. RECRIM'INATIVE, a. *-nā-tĭv*, or RECRIM'INA'TORY, a. *-nā'tēr-ĭ*, retorting accusation. RECRIM'INA'TOR, n. *-tēr*, one who recriminates. RECRIM'INA'TION, a. *nā'shŭn*, the charge against an accuser of a like crime by the person accused.

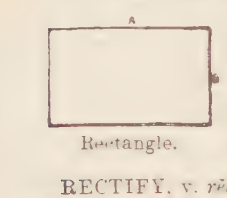
RECROSS, v. *rē-krŏs'* [*re*, again, and *cross*]: to cross a second time. RECROSS'ING, imp. RECROSSED, pp. *rē-krŏst'*.

RECRUDESCENT, a. *rē'krô-dĕs'sĕnt* [L. *recrudes'cens* or *recrudescen'tem*, growing raw again—from *re*, again; *crudes'co*, I become raw—from *crudus*, raw]: growing raw or sore again. RECRUDES'CENCE, n. *-dĕs'sĕns*. RECRUDES'CENCY, n. *-dĕs'sĕn-sĭ*, or RECRUDENCY, *rē-krô'dĕn-sĭ*, the state of becoming sore or raw again.

RECRUIT, n. *rē-krōt'* [F. *recruter*, to recruit: OF. *recroist*, a reincrease, a new or second growth; *recroistre*, to grow or spring up again—from L. *re*, again; *crescĕrĕ*, to grow]: a new supply of anything wasted or deficient, a newly enlisted soldier: V. to supply or fill up; to reinforce; to raise new soldiers; to regain or repair, as one's strength. RECRUIT'ING, imp.: ADJ. enlisting recruits: N. the act of beating up for recruits (see ENLISTMENT: CONSCRIPTION: MANNING THE NAVY: BOUNTY: COAST VOLUNTEERS: IMPRESSMENT). RECRUITED, pp. RECRUIT'ER, n. *-ĕr*, one who recruits. RECRUIT'ING, n., or RECRUIT'MENT, n. *-mĕnt*, the act or employment of raising new soldiers for an army. RECRUITING-SERGEANT, formerly in the Brit. army, an old sergeant whose duty it was to enlist recruits.—SYN. of 'recruit, v.': to repair; retrieve; recover; regain; reinvigorate; refresh.

RECRYSTALLIZE, v. *rē-krĭs'tăl-īz* [*re*, again, and *crystallize*]: to crystallize a second time.

RECTANGLE, n. *rĕkt′ăng-gl* [F. *rectangle*, a rectangle—from L. *rectus*, right; *angulus*, an angle: Sp. *rectangulo*]: in *geom.*, a four-sided figure having all its angles right angles. RECTANGULAR, a. *rĕkt′-ăng′gū-lĕr*, having right angles. RECTAN′GULARLY, ad. *-lĕr-lĭ*.



Rectangle.

RECTEMBRYÆ, n. plu. *rĕk-tĕm′brĭ-ē* [L. *rectus*, straight; Gr. *embrŭŏn*, the fetus]: in *bot.*, those leguminous plants that have the embryo straight in the axis of the seed.

RECTIFY, v. *rĕk′tĭ-fī* [F. *rectifier*, to rectify—from L. *rectus*, straight; *facio*, I make]: to make or set right; to correct; to redress; in *chem.*, to purify a substance by repeated distillation: to regulate or adjust. RECTIFYING, imp. RECTIFIED, pp. *-fīd*: ADJ. improved by redistillation. RECTIFIER, n. *-fī-ĕr*, one who rectifies; that which rectifies or corrects; one licensed to refine and compound spirits. RECTIFIABLE, a. *-fī′ă-bl*, capable of being corrected or set right. RECTIFICATION, n. *rĕk′tĭ-fĭ-kā′shŭn* [F.—L.]: the act or operation of correcting or setting right: in *chem.*, the repeated distillation of a spirit in order to make it finer and purer (see RECTIFYING): in *astron.* and *geog.*, the putting the globe into a proper position to obtain a correct answer to a problem: in *geom.*, the determination of a straight line, the length of which is equal to a portion of a curve.—SYN. of 'rectify': to correct; reform; amend; emend; mend; better; redress; adjust; improve; regulate.

RECTIFYING: process applied to alcohol after its distillation, to remove certain impurities which come over with it from the still. These, in part, consist of essential oils; and to effect their removal, caustic potash is added in sufficient proportion to saponify the oil present; water also is contained in the first distillation, and to remove this, and to assist in removing the oily matters, common pearl-ash is added. Technically, the former of these is called *gray salts*, and the latter, *white salts*; and about four lbs. of each are added to every 700 gallons of spirit, and well agitated, so as to combine with the oil and water. The spirit is then distilled again, and comes over much more pure, the alkaline salts, and the matters which have been combined with them, being left behind in the still. This is usually repeated two or three times, the quantity of the salts being diminished to one-half in the second, and proportionately decreased in the succeeding distillations. The rectifier is not only a purifier of the alcohol produced by the distiller, but he often gives it a distinctive character; by adding flavoring materials to it, he makes it into gin, brandy, etc. Thus, to convert the spirit into London gin, juniper berries and coriander seeds are added previous to the last rectification. Œnanthic ether and other things give the flavor of brandy. This part of the operation is much varied by the taste and skill of the rectifier.

RECTILINEAL, a. *rĕkt'ĭ-lĭn'ē-ăl*, or RECT'ILIN'EAR, a. *-ē-ĕr* [L. *rectus*, straight; *linĕă*, a line: It. *rettilineo*, rectilinear]: consisting of right lines, or bounded by them; straight. RECT'ILIN'EAR'ITY, n. *-ĭ-tĭ*, state of being rectilinear.

RECTINERVIS, a. *rĕkt'ĭ-nĕr'vĭs* [L. *rectus*, straight; *nervus*, a nerve]: in *bot.*, straight and parallel-veined.

RECTIROSTRAL, a. *rĕkt'ĭ-rŏs'trăl* [L. *rectus*, straight; *rostrum*, a beak]: having a straight beak.

RECTISERIAL, a. *rĕkt'ĭ-sē'rĭ-ăl* [L. *rectus*, straight; *serĭēs*, a row]: in *bot.*, disposed in a rectilinear or straight series—applied to leaves: see CURVISERIAL.

RECTITUDE, n. *rĕk'tĭ-tūd* [F. *rectitude*—from L. *rectitu'dinem*, rectitude—from *rectus*, straight or upright]: uprightness; rightness of principles and practice; integrity; right judgment; honesty; probity.

RECTO, n. *rĕk'tō* [L. *rectus*, right]: the right hand page of a book, opposed to *verso*.

RECTOR, n. *rĕk'tĕr* [L. *rector*, a ruler, a master—from *rego*, I rule or govern: L. *recteur*], in the *Chh. of Eng.*, a clergyman holding complete and independent charge of a parish and who receives the large and small tithes, or the clergyman of a parish where the tithes are not impropriate: the canonical signification meant rather a clergyman appointed to govern a parish where the chief parochial jurisdiction was vested in a religious corporation, or in some non-resident dignitary. In *Scot.*, the head-master of a higher-class school; the head of a convent or religious house; the chief officer in universities in Scotland, also in France, elected by the students. REC'TORSHIP, n. the office of a rector; also REC'TORATE, n. *-āt*. RECTORY, n. *rĕk'tĕr-ĭ*, a rector's house; also his benefice and the full rights connected with it. REC'TORAL, a. *-ăl*, or RECTORIAL, a. *rĕk-tō'rĭ-ăl*, pert. to a rector.

RECTRIX, n. *rĕk'trĭks*, n. pl. RECTRICES, *rĕk-trī'sēz* [L. fem. of *rector*, a ruler]: one of the long quill feathers in the tail of a bird, which guides its flight like a rudder.

RECTUM, n. *rĕk'tŭm* [L. *rectus*, straight]: in *anat.*, the last part of the large intestine, so called because comparatively straight (see RECTUM, DISEASES OF THE). RECTUS, a. *-tŭs*, in *bot.*, applied to the stem and other straight parts of plants; in *anat.*, applied to several muscles of the body, on account of the rectilinear direction of their fibres. RECTOCELE, n. *rĕk'tō-sēl* [prefix, *recto*; Gr. *kēlē*, a tumor]: hernia of the rectum.

RECTUM, DISEASES OF THE: various diseases of the terminal portion of intestinal canal. For some of these affections—e.g., piles, prolapsus ani, and hemorrhage from the rectum—see their respective titles. Among other diseases of the rectum are the following:

1. *Stricture of the Rectum*, either spasmodic or permanent. *Spasmodic stricture* is comparatively rare. *Permanent stricture* may be either simple or malignant. *Simple stricture* consists in thickening and induration of the mucous coat of the rectum, so as to form a ring encroaching on the calibre of the tube. It is situated about two or three inches from the anus, and the contraction is so great and unyielding that it is often difficult to pass a finger through it. The symptoms are constipation and great pain, and a straining in evacuating the faeces, which are passed in a narrow, flattened, or worm-like form, significant of the nature of the case. In an advanced stage of the disease, diarrhœa and prolapsus often supervene. However great may be the constipation, strong irritant purgatives must be altogether avoided. Soft and unirritating evacuations must be procured by such medicines as the confection of senna combined with sulphur (see PILES), or injections of castor-oil or of tepid water. The diet should be regulated to assist the action of the medicines. Nutritious soups are serviceable, since, at the same time, they support the strength and leave little matter to be excreted. When much local irritation is present, it may be relieved by the hip-bath and by sedative injections; till it is subdued, surgical interference would do more harm than good. A bougie capable of being passed with moderate pressure through the stricture, should be inserted in the gut every third or fourth day, and should be allowed to remain about a quarter of an hour; and its size should be gradually increased. Nothing is gained by forcible passage of large bougies. The cure is to be effected by pressure so applied as to produce absorption, not by mere mechanical dilatation. *Malignant stricture*—due usually to the scirrhous, sometimes to the epithelial form of cancer—is not very rare, and is more frequent in the female than the male sex. Until ulceration sets in, the symptoms are like those of simple stricture, only exaggerated in degree; but afterward there is discharge of fetid muco-purulent matter streaked with blood. In this disease, the treatment can be only palliative, unless the surgeon resort to the formation of an artificial anus in the loins as a last resource.

2. *Spasm* of the *sphincter ani* muscle is characterized by extreme pain in the region of the anus, especially when an attempt is made to evacuate the bowels. The muscle contracts so firmly that the surgeon cannot easily introduce the finger into the rectum. The spasm may be caused by piles, by fissure of the anus, by ulceration of the rectum, sometimes apparently by mere constipation.

3. *Neuralgia of the rectum*, known also as *proctalgia*, is

a common disorder, prone to attack children and gouty persons. It is usually relieved by judicious use of aperient medicines.

4. *Congestion*, sometimes proceeding to *inflammation*, is frequent in the rectum. The congestion occasions a sense of weight and fulness in and about the rectum, together with a variety of other symptoms. Among the causes of this affection are stone in the bladder, stricture of the urethra, an enlarged prostate gland, presence of thread-worms, abuse of irritating purgatives, exposure to cold draughts in the water-closet, etc.; and there can be no doubt that sedentary habits strongly favor the predisposition to this affection. The great object of treatment is to relieve the over-loaded vessels of the rectum. The bowels should be freely opened with castor-oil, leeches should be applied to the verge of the anus, and after their removal a warm hip-bath is advisable.

5. *Pruritus podicis*, or *itching of the anus*, is a very frequent and troublesome affection. Sometimes it depends on the presence of thread-worms or of old piles; in other cases it is one of the manifestations of the skin-disease *Prurigo* (q.v.). The treatment must depend upon the exciting cause.

6. *Fissure of the anus* is a small crack which gives intense pain during the passage of the fæces, and often for several hours. Free purgatives and application of astringent lotions or ointments (as tannin lotion or ointment of galls) should be tried; and if they fail, partial division of the sphincter muscle must be resorted to—an operation easily performed, and certain to give relief.

7. *Fistula in ano* signifies a fistulous or pipe-like track by the side of the *sphincter ani* muscle. It may occur as a *complete fistula*, which has an external opening near the anus, and an internal opening into the bowel; or as a *blind external fistula*, which has no actual opening into the bowel, though it extends to its outer coat; or as a *blind internal fistula*, in which the preceding conditions are reversed. For mode of treatment, see FISTULA.

For detailed description of these diseases—and others less important—of the rectum, see Bushe's *Treatise on the Rectum*, and more recent works of Ashton and Henry Smith on the same subject.

RECULE, or RECUILE, v. *rĕ-kūl′* [F. *reculer*, to draw back]: the old spelling of RECOIL, which see.

RECUMBENT, a. *rĕ-kŭm′bĕnt* [L. *recum′bens* or *recumben′tem*, lying down, reclining at table—from *re*, back; *cubo*, I recline]: leaning; reclining; prostrate; inactive. RECUBATION, n. *rĕk-ū-bā′shŭn*, the act of lying down, leaning, or reclining. RECUM′BENTLY, ad. *-lĭ*. RECUM′BENCE, n. *-bĕns*, or RECUM′BENCY, n. *-bĕn-sĭ*, the posture of lying or leaning; rest; repose.

RECUPERATIVE, a. *rē-kū'pēr-ā'tĭv*, or RECU'PERA'TORY, a. *-ā'tēr-ĭ* [L. *recuperātus*, recovered; *recupĕrārĕ*, to recover—from *re*, back; *capio*, I take: It. *recuperare*; F. *récupérer*, to recover]: tending or pert. to recovery. RECU'PERA'TION, n. *-ā'shŭn*, recovery, as of anything lost.

RECUR, v. *rē-kĕr'* [L. *recurrĕrĕ*, to return, to recur—from *re*, back; *curro*, I run: Sp. *recurrir*: F. *recourir*]: to return to the thought or mind; to have recourse to; to occur at a stated interval, or according to some established rule. RECUR'RING, imp.: ADJ. applied to that portion of a decimal fraction which repeats itself in the same order of figures—more usually called *circulating decimals*. RECURRED, pp. *rē-kĕrd'*. RECURRENT, a. *rē-kŭr'rĕnt* [L. *recur'rens* or *recurren'tem*, returning]: returning from time to time; of *crystals*, reflected or running back again; in *anat.*, applied to tumors which return after removal. RECUR'RENTLY, ad. *-lĭ*. RECUR'RENCE, n. *-rĕns*, or RECUR'RENCY, n. *-rĕn-sĭ*, return; resort.

RECURE, v. *rē-kūr'* [F. *recourer*, to recover]: the OE. spelling of RECOVER, which see; to recover from sickness or labor; to find a remedy for: N. recovery; remedy. RECU'RING, imp. RECURED', pp. *-kūrd'*.

RECURSANT, a. *rē-kĕr'sant*: in *her.*, said of an eagle, displayed, with the back toward the spectator's face. RECURSANT VOLANT IN PALE, said of an eagle, as it were flying upward, with its back toward the spectator's face.

RECURVATE, a. *rē-kĕr'vāt* [L. *recurvātus*, curved backward—from *re*, back; *curvus*, crooked]: in *bot.*, bent or curved downward; bent backward: V. to bend back; to recurve. RECUR'VATING, imp. RECUR'VATED, pp. RECURVATION, n. *rē'kĕr-vā'shŭn*, or RECURVATURE, n. *rē-kĕr'vā-tūr*, the act of recurving, or state of being recurved. RECURVE, v. *rē-kĕrv'*, to bend or curve back. RECUR'VING, imp. RECURVED', pp. *-kĕrvd'*, bent backward. RECURVITY, n. *rē-kĕr'vĭ-tĭ*, a bending or curving backwards.

RECURVIROSTRAL, a. *rē-kĕr'vĭ-rŏs'trăl* [L. *recurvus*, bent back; *rostrum*, a beak]: having the beak recurved or bending upward—applied to the genus of birds, RECUR'VIROS'TRA, *-rŏs'tră*.

RECUSANT, a. *rĕk′ū-zănt* [L. *rĕcūsans* or *rĕcūsan′tem*, rejecting, refusing; *recusārĕ*, to refuse—from *re*, back; *causa*, a cause: F. *récuser*, to except against, to refuse]: refusing to conform or to take certain oaths; opposing an opinion: N. in *Eng. hist.*, one who refused to acknowledge the king's supremacy as head of the church, or to conform to the church's rites, or who refused or neglected to attend at the Established Church service on Sundays and other appointed days. The offense as a legal one may be held to date from 1 Elizabeth c. 2; but there were four classes punishable under the statutes against recusancy—simple 'recusants;' 'recusants convict,' who absented themselves after conviction; 'popish recusants,' who absented themselves because of their being Rom. Catholics; and 'popish recusants convict,' who absented themselves after conviction. It was against the last two classes mainly that the statutes were directed. In addition to the general penalties of recusancy, the popish recusants, for wilfully hearing mass, forfeited 100 marks ($324); and for saying mass, 200 marks ($648), in addition (in both cases) to a year's imprisonment. They were disabled, unless they renounced popery, from inheriting, purchasing, or otherwise acquiring lands; and they could not keep or teach schools under pain of perpetual imprisonment. Popish recusants convict could not hold any public office; could not keep arms in their houses; could not appear within ten miles of London under penalty of £100; could not travel above five miles from home without license; could not bring any action at law or equity; could not have baptism, marriage, or burial performed, except by an Anglican minister; all under penalties of forfeiture and imprisonment. Protestant dissenting recusants were relieved from the penalties of recusation by the Toleration Act of 1 Will. and Mary, c. 18. Rom. Catholics were partially relieved 1791, and completely by the Emancipation Act 1829. RECUSANCY, n. *rĕk′ū-zăn-sĭ*, non-conformity.

RECUSE, v. *rē-kūz′*: to reject a judge; to challenge that the judge shall not try the cause.

RED, n. *rĕd* [Goth. *rauds*; Icel. *raudr*; Dan. *röd*; W. *rhudd*; Ger. *roth*; Ir. and Gael. *ruadh*; L. *rūtĭlus*, *ruber*, *rufus*; Gr. *erŭthrŏs*, red]: one of the primary colors, having several varieties of shade, as scarlet, crimson, pink, etc.: ADJ. having a bright color like that of arterial blood. RED′LY, ad. *-lĭ*. RED′NESS, n. *-nĕs*, the quality of being red. RED′DISH, a. *-ĭsh*, having some degree of redness. RED′DISHNESS, n. *-nĕs*, a moderate degree of redness. RED ANT, a very small species of ant, of a red color. RED ANTIMONY, a crystalline mineral of red color. RED-BAY, a species of laurel. RED-BOOK, in *England*, a name applied to a book containing names of all persons in service of the state. RED-BERRIED, a. *-bĕr′rĭd*, having red berries, as a plant. RED-CHALK, a kind of clay ironstone; Reddle (q.v.). REDCOAT, a

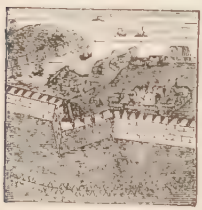
familiar name for a soldier. RED CORAL, a species of coral of a bright red color; precious coral. RED CROSS, the cross of St. George, the national emblem of England; name of a soc. for affording aid to the wounded in battle, etc. (see RED CROSS ASSOCIATION). RED-DEER, the common stag, a native of the temperate regions of Europe and Asia (see STAG). RED-FIRE, a pyrotechnical compound, which burns with a beautiful red or pink flame. RED-HAIRED, a. having sandy or carroty hair, as on the head. RED-HAND, or RED-HANDED, ad. in the very act, as it were with red or bloody hands. RED HAND, in *her.*, distinguishing badge of the baronets of Great Britain and Ireland, granted 1611. RED-HOT, a. heated to redness. RED-IRON ORE, a name applied to an ore of iron, including those varieties of hematite which have a non-metallic or sub-metallic lustre. RED-LEAD, a cheap scarlet pigment, the red oxide of lead of the chemists, a mixture of the monoxide and dioxide—used for painting and in the arts; minium. RED-LETTER DAY, a day whose recollection brings pleasure; a lucky day—so named from the principal saints' days and the chief church festivals being marked in the calendars in red letters. RED-LIQUOR, a crude acetate of alumina much used in calico-printing. RED-MAN, or RED-SKIN, one of the copper-colored aboriginals of Amer., as distinguished from the *white* men. RED-MARL, a familiar name for the upper members of the New Red Sandstone or Trias, developed in England—known also by the name of *variegated marls*. RED OCHRE, a term comprehending a class of colors rather than an individual color, as Indian red, scarlet ochre, etc. RED ORPIMENT, or REALGAR, a pigment obtained in a native state by heating arsenic and sulphur in certain proportions: the disulphide of arsenic (see REALGAR). REDPOLE: see LINNET. RED-PRECIPITATE, the red oxide of mercury obtained by calcining the nitrate. RED REPUBLICAN, one prepared to maintain and enforce extreme republican doctrines, even at the expense of blood. RED-SAND, a sediment sometimes deposited from the urine on cooling. RED SEA, the long, narrow, deep channel lying between Arabia and Africa, formerly separated from the Mediterranean Sea by the Isthmus of Suez, but now united to it by a canal admitting the passage of large vessels. REDSHANK, bird (see SANDPIPER). REDSHORT, a. breaking short when red-hot, as a metal. REDSTART [AS. *steort*, a tail]: small singing-bird (see below). RED-TAPE, tape of a red color—used for tying up loose docu-

Red-deer.

ments in public offices; extreme official formality. RED-TAPISM, *-tapizm*, strict adherence to official formalities. RED-TAPIST, a public official stupidly tenacious of strict official formality and routine.

REDACTION, n. *rē-dăk'shŭn* [F. *rédaction*, drawing up, editing—from L. *redigĕre*, *redactum*, to reduce to order—from *re*, again; *agĕre*, to do]: the act of digesting or arranging in order; the digest so made. RÉDACTEUR, n. *rē-dăk-tĕr'* [F. *rédacteur*]: one who digests and arranges matter for publication; an editor. REDACTOR, n. *rē-dăk'tĕr*, one who puts anything into shape.

REDAN, n. *rē-dăn'* [F. *redan*; OF. *redent*, a redan—from L. *re*, back or again; *dens* or *dentem*, a tooth]: the simplest work in field-fortification; consisting of two parapets whose faces join in forming a salient angle toward the enemy, like a letter V, the apex to the front. Regarded by itself, the R. is a work of very little strength, since there is no flanking fire to protect its faces, and nothing to prevent an enemy from forcing an entrance at the gorge; yet redans are useful in many positions, and the rapidity with which they may be constructed renders them favorites with engineers and generals.



Redan, Sebastopol.

REDARGUE, v. *rē-dăr'gū* [OF. *rédarguer*, to reprove: L. *redargu'ĕrĕ*, to disprove or contradict—from *re*, back, again; *argūō*, I accuse, I charge with]: in *OE.*, to refute; to put to silence by argument. REDAR'GUING, imp. REDARGUED, pp. *rē-dăr'gūd*.

RED BANK: town, Monmouth co., N. J.; on Shrewsbury river, near its junction with the Navesink, at the head of navigation, and on the New Jersey Central and the Pennsylvania r. rs. It has regular steamboat connection with New York; has an iron foundry, canning-establishments, carriage and gold-leaf factories, 2 national banks, several academies, a public library, etc.—Pop. (1880) 2,684; (1890) 4,145.

RED'BREAST (*Erythaca rubecula*, or *Sylvia rubecula*): bird of family *Sylviadæ*, familiar throughout most parts of Europe—a universal favorite, from the readiness with which it approaches or enters human habitations, its lively manners, its aspect of pert curiosity, the frequency with which its song is heard in autumn and winter, and the strange mixture of shyness and audacity which its behavior displays. It is generally known in Britain by the endearing name *Robin Redbreast*, more briefly *Robin*, and has many similar appellations in continental Europe, significant of the kindly regard entertained for it, which is everywhere such that children early begin to distinguish it from all other birds as their peculiar favorite. Its utmost length is about $5\frac{3}{4}$ inches, but it is of rounder and fuller form than many of the *Sylviadæ*, the slender-

ness of its legs rather strikingly contrasting with the form of the body. The wings are rather short, the fifth quill the longest. The tail is scarcely forked. The bill is rather broad and depressed at the base, narrower and slightly compressed at the point, the upper mandible bent down and notched. The general color is olive-brown, and the reddish-orange breast is a conspicuous characteristic, particularly of the male.—The R. is a native not only of Europe, but of w. temperate Asia and n. Africa. In the most northern parts of Europe it does not appear; and in many northern regions it may be regarded as a bird of passage; but, contrary to the ordinary rule as to birds of passage, it never congregates in flocks; it is seen always either solitary or in pairs. The attachment of pairs seems to extend beyond the mere breeding season, and, indeed, throughout their lives, and to be stronger than in most birds. The breeding season is early in spring. The nest is made of moss, dead leaves, and dried grass, lined with hair, often placed a little above the ground in a bush or among ivy on a wall; the eggs five to seven in number, white, spotted with pale reddish-brown; but many are the stories of the curious situations in which the R. has built its nest, in close proximity to houses and workshops, regardless of the presence of human beings, and of the noise of hammers and wheels. In winter, the R. seeks the neighborhood of human habitations more than in summer, and becomes more bold and familiar. Its food consists usually of worms, insects, and berries; and when it becomes a pensioner at any door or window, which it very readily does, it shows particular relish for small scraps of meat. Its song is sweet and plaintive, but weak, not much noticed amid the many voices of summer, but often heard in the quietness of autumn, and even of winter, throughout which it is continued whenever the weather is good.

In America, the name R. is given usually to one of the Thrushes (*Turdus migratorius*).

RED CLOUD: North American Indian; chief of the Ogalala Sioux. He is considered by many army officers the ablest and wisest of all the Sioux since the death of Spotted Tail. After the Fetterman massacre (1866) he refused to meet the special peace commission or to sign any treaty. In the outbreak which led to the Custer massacre and the flight of Sitting Bull to Canada 1876, he declined to aid Sitting Bull, notwithstanding which Gen. Crook deposed him from his command and sent him to the Pine Ridge Agency, S. D., and the govt. confiscated his ponies and other property. In 1888–9, when govt. commissioners were attempting to induce the Sioux to sell their reservation in S. D., that it might be opened to settlement, R. C. refused to sign or to let his Indians sign the treaty. When the govt. agreed to pay him $28,000 for the ponies and property confiscated 1876, he signed the treaty and induced the chiefs still holding

out to do so also. He refused an appeal of Sitting Bull to order an uprising of his tribe at Pine Ridge Agency on the strength of the Messiah craze 1890-1; and after his bucks had joined Sitting Bull's ghost-dancers in the Bad Lands, he was the first influential Indian to accept Gen. Miles's invitation to return to the agency under a pledge of amnesty. R. C. has visited Washington 10 times on business connected with the Sioux, professes friendship for the whites and a desire to have his people live like them, and claims to have been working under the direction of the govt. since he was made a chief, 1869.

RED COLORS: various red pigments used by painters; consisting of certain chemical compounds, natural or artificial. Thus, the red pigment Armenian Bole is either the ochreous earth known by that name, imported from Armenia, Tuscany, and other places, or else most frequently a composition of whiting, red oxide of iron, and red ochre. Vermilion is a sulphuret of mercury produced either naturally or artificially. Chrome-red is made by boiling carbonate of lead with chromate of potash in excess, until it assumes a red color, after which it is washed in pure water, and dried in the shade. Indian-red is a native product of Persia, found in the neighborhood of Ormuz: it is imitated by calcining colcothar with red ochre. Light-red is made by calcining yellow ochre, and this can be converted into flesh color by due admixture of white. A bright orange-red, sometimes called Sandix, is made by calcining white-lead. Minium, or red-lead, is a very distinct red color, requiring little preparation; it is much used. Red ochre is an oxide of iron; with clay, it forms a brownish-red paint. There are several other red colors, but these are the principal ones employed by painters.

RED CRAG: deposit of quartzose sand intermixed with rolled and comminuted shells, of deep ferruginous or ochreous color, in Suffolk, England; belonging to the Pliocene (q.v.) strata.

RED CROSS ASSOCIA'TION: organization for international relief to the sick and wounded in war. The care of the wounded in battle dates as far back as the history of war itself. In the time of Adrian we read of tents set apart for the wounded, and in the Dacian wars Trajan had something resembling ambulances. In the 9th c., special corps for care of the wounded were organized by Emperor Leo VI.; and Saladin allowed the Knights of St. John to enter Jerusalem and attend on their wounded comrades—these Knights of St. John being represented at the present day by the 'Johanniter Ritter' of Prussia, and the British National Soc. for relief of the sick and wounded. In the Seven Years' War, Frederick and Louis XVI. treated the medical staff as neutrals. Throughout the Napoleonic wars, Baron Larrey, surgeon-in-chief of the French army, and the first to introduce 'ambulances volantes,' figures on the French side, and Sir James M'Grigor, though in less degree, on

the English side, as the ablest organizers of mercy to the suffering victims. The labors of Florence Nightingale (q.v.) and her staff in the Crimean war will not be forgotten.—The R. C. A. had its origin in a proposal made 1863, Feb., at a meeting of the *Société Genévoise*, by Dunant, who had witnessed the horrors of the Italian battle-fields—'Whether it would not be possible in time of peace to form societies for relief of the wounded when war should again break out?' A committee appointed to examine into the subject convoked an international congress at Geneva 1863, Oct. A general congress being again held at Geneva 1864, Aug., at which 16 European powers were represented, the terms of a treaty were arranged, and signed by 12 delegates, later on by 4 others. The principal terms of this convention were, that ambulances and military hospitals be acknowledged neutral, and with all persons employed in them, as also all inhabitants of the country who may bring help to the wounded, be respected and protected by belligerents; further, that wounded or sick soldiers be taken care of, to whatever nation they belong. In 1864 numerous committees were organized, who all conformed to the resolutions of the Geneva committee. At a conference of delegates from all European states, Paris 1867, the convention was extended to naval warfare. See GENEVA CONVENTION. The Red Cross Soc. of America was organized 1877, under the presidency of Clara Barton (q.v.); the United States acceded to the articles of the Geneva convention and the soc. was reorganized and incorporated as the American Assoc. of the Red Cross 1882, and twelve national calamities have called forth its prompt and most efficient work since. Forty governments were united in this humane compact 1896. In 1893 the American Assoc. received from Dr. Joseph Gardner, of Bedford, Ind., the gift of an improved tract of land comprising more than one sq. m., with buildings and full farm appurtenances, for a general headquarters, rendezvous, and centre of collection and storage of materials; this tract would be absolutely neûtral territory in case of war.

RED CROSS OR'DER: instituted by Queen Victoria, 1883, to distinguish those who should render eminent service in nursing the sick and wounded of the Brit. army and navy. The decoration is a cross of crimson enamel gold-edged, attached to a dark-blue ribbon red-edged, one inch in width, tied in a bow and worn on the left shoulder.

RED CROSS SOCI'ETIES: see GENEVA CONVENTION.

REDD, n. *rĕd* [W. *rhid*, what oozes or drains, semen]: in *Scot.*, the spawn of salmon or other fish; the green ooze at the bottom of pools. REDDS, n. plu. *rĕdz*, the spawning-places in rivers for salmon, as salmon-*redds*.

RED-DEER: see under RED.

REDDEN, v. *rĕd'n* [from RED, which see]: to make red; to become red; to blush. REDDENING, imp. *rĕd'nĭng*: ADJ. becoming red. REDDENED, pp. *rĕd'nd*.

REDDENDUM, n. *rĕd-dĕn′dŭm* [L. *reddendum*, to be returned—from *re*, back, and *dărĕ*, to give]: in *law*, the clause in a lease by which rent is reserved.

REDDINGITE, n. *rĕd′dĭng-īt* [after Redding, Conn., near which it was found]: an orthorhombic mineral found associated with various others in a vein of albitic granite. Hardness, 3 to 3·5; sp. gr. 3·102; lustre, vitreous to sub-resinous; color, pale pink to yellowish white; translucent to transparent; fracture, uneven. Composition: phosphoric acid, 34·72; protoxide of manganese, 52·08; water, 13·20 = 100, represented by the formula $Mn_3P_2O_8 + 3aq$.

REDDISH, REDDISHNESS: see under RED.

REDDITCH, *rĕd′dĭch*: busy manufacturing town of Worcestershire, England; on an acclivity 12½ m. s.s.w. of Birmingham, with which it is connected by railway. Needles, pins, fish-hooks, and fishing-tackle are made extensively. Pop. (1871) 6,135; (1881) 9,964(1891) 11,295.

REDDITION, n. *rĕd-dĭsh′ŭn* [F. *reddition*, a giving in, as of accounts—from L. *redditiōnem*, a giving back, returning—from *re*, back; *dărĕ*, to give]: a returning of anything; restitution; surrender; explanation. RED′DITIVE, a. *-tĭv*, returning; answering to an interrogative.

REDDLE, n. *rĕd′dl*, or RADDLE, or RUDDLE, or RED-CHALK, or RED-CLAY [from RED, which see: Ger. *röthel*]: red argillaceous ore of iron, being simply decomposed hematite, and having a strong clayey odor when breathed on. It is produced chiefly in the European continent—in Hessia, Thuringia, Upper Lusatia, Silesia, and Salzburg. It is found in small quantities in England. The English differs somewhat from the foreign, and is used chiefly in polishing spectacle glasses. Of that from the continent, the finest quality is used for drawing on paper; the inferior sorts are used by carpenters and others for marking with; and the commonest (usually called Reddle) for marking sheep. It occurs generally in thin beds, in clay-slate. It is very rare in the United States.

REDE, v. *rēd* [AS. *rædan*, to read, to interpret; *ræd*, counsel, advice]: in *OE.* and *Scot.*, to counsel; to advise; to interpret: N. counsel; advice.

REDEEM, v. *rē-dēm′* [F. *rédimer*—from L. *redim′ĕrĕ*, to buy back—from *re*, back; *emo*, I buy; *emptus*, bought: It. *redimere*]: to deliver from captivity, or from any liability to suffer, by paying a price; to ransom; to recover; to repurchase; to save or improve, as time; to make good by performance; to regain a thing alienated by repaying the price of it to the possessor (see REDEMPTION, EQUITY OF); to receive back by paying an obligation entered into, as a promissory-note; to pay the penalty of; to perform the work of redemption; in *OE.*, to recompense; to compensate; to make amends for. REDEEM′ING, imp. REDEEMED′, pp. *-dēmd′*. REDEEM′ER, n. *-ĕr*, one who ransoms; a title of the Lord Jesus. RE-

DEEM'ABLE, a. *-ă-bl*, that may be redeemed. REDEEM'ABLENESS, n. *-nĕs*, the state of being redeemable. REDEMP'TION, n. *-dĕm'shŭn*, ransom; release; repurchase; deliverance from sin and misery by the death of Christ. REDEMP'TIONER, n. *-ĕr*, an emigrant who sells his services for a certain time to pay his passage-money. REDEMP'TIVE, a. *-tĭv*, pert. to redemption. REDEMP'TORIST, n. *-tĕr-ĭst*, in the *Rom. Cath. Chh.*, one of a religious order founded in Naples by St. Alfolzo Liguori 1732, and revived in Austria in 1820—called also *Liguorists* and *Liguorians* (q.v.). REDEMP'TORY, a. *-tĕr-ĭ*, paid for ransom.

REDELIBERATE, v. *rē'dĕ-lĭb'ĕr-āt* [*re*, again, and *deliberate*]: to reconsider.

REDELIVER, v. *rē'dĕ-lĭv'ĕr* [*re*, again, and *deliver*]: to deliver again; to liberate a second time. RE'DELIV'ERY, n. *-ĕr-ĭ*, a second delivery or liberation. RE'DELIV'ERANCE, n. *-ăns*, a second deliverance.

REDEMAND, v. *rē'dĕ-mănd'* [*re*, again, and *demand*]: to demand back again: N. a demanding back again.

REDEMPTION: see under REDEEM.

REDEMP'TION, EQUITY OF, in Law: applied frequently to the right of redeeming property pledged to secure a debt—e.g., in case of mortgage of real estate, the mortgagor, after executing a deed of mortgage, having a right at any time to pay off the debt, and redeem or get back his property, unless he has been foreclosed by the creditor by a legal proceeding.

REDEMP'TIONISTS: one of the names of an order of monks devoted to the redemption of Christian captives from slavery; more frequently called TRINITARIANS (q.v.).

REDEMPTORISTINE, n. *rĕ-dĕmp-tĕr-ĭst'ĕn*: in *chh. hist.*, an order of nuns, constituting the Order of the Most Holy Redeemer, founded by St. Alphonzo Maria de' Liguori. They are cloistered nuns, contemplative, subject to the jurisdiction of the bishop of the diocese in which they reside, and assist the missionaries of the Congregation by their prayers. The Redemptoristines wear a red habit, with a blue scapular and white shoes. They have a house at Dublin.

REDENTED, a. *rē-dĕnt'ĕd* [L. *re*, back or again; *dens* or *dentem*, a tooth]: formed like the tooth of a saw; indented.

REDESCEND, v. *rē'dĕ-sĕnd'* [*re*, again and *descend*]: to descend again.

RED′-EYE, or RUDD, *rŭd* (*Leuciscus erythrophthalmus*, [see LEUCISCUS]): fish of family *Cyprinidæ*, common in lakes, slow rivers, fens, etc., in many parts of Europe. It much resembles its congener the Roach (q.v.), but is shorter and deeper. It is a richly colored fish. The

Red-eye, or Rudd (*Leuciscus erythrophthalmus*).

name Rudd refers to the color of the fish, the name Red-eye to that of its iris. The R. is better food than the roach. It is readily caught by a baited hook. It sometimes attains a weight of two lbs.

REDFIELD, *rēd′fēld*, ISAAC FLETCHER, LL.D.: jurist: 1804, Apr. 10—1876, March 23; b. Wethersfield, Vt. Having graduated at Dartmouth Coll., 1825, he studied law, and was admitted to the bar. He became judge of the Vt. supreme court 1835, and chief-justice 1852, retiring from the bench 1860. He was prof. of medical jurisprudence at Dartmouth 1857–61, when he removed to Boston. He was special counsel of the United States in England and France 1867–69. He is author of treatises on *The Law of Railways* (5th ed. 1873); *Law of Wills* (1864–70, 3 vols.); *Civil Pleading and Practice* (1868); *Carriers and Bailments* (1869); *Leading Amer. Railway Cases* (1870, 2 vols.). He was editor of the *Amer. Law Register* 1862 till his death.

RED-GUM, *rĕd′-gŭm*: popular name for the papulous disease of the skin known to the physician as *Strophulus*; a florid eruption, usually occurring in infants before or during their first dentition, and appearing on the most exposed parts, as the face, neck, arms, and hands, whence it sometimes extends to other portions of the body. It occurs in minute red pimples, irregularly placed, with occasional red patches, and sometimes a few interspersed vesicles. White pimples, popularly known as *white-gum*, are also sometimes intermingled with the red papillæ. Strophulus is almost always an acute disease, seldom lasting more than a month. It is almost always harmless, and with no marked disturbance of general health. In severe cases, the pimples cause a sensation of heat and itchiness, especially if the child is kept too warm, and slight febrile symptoms

manifest themselves. Among the probable causes of this disease are the irritation caused by rough flannel next the skin, lack of cleanliness of the skin, especially in relation to the child's excretions—general disturbance of the system excited by teething, etc. Very little is required in treatment further than to remove any obvious cause. Cold applications should be carefully avoided, lest they should translate the cutaneous irritation to some important internal organ. In the event of such a translation, the child should be placed in a hot bath, and mustard poultices, or hot moist cloths sprinkled with turpentine, applied over the arms and chest.

REDHIBITION, n. *rĕd-hĭ-bĭ'shăn* [L. *redhibitio*—from *redhibitus*, pp. of *redhibeo*, I give or receive back—*red*, back; *habeo*, I have]: in *law*, an action allowed to a purchaser by which to annul the sale of some movable, and oblige the seller to take it back again upon the purchaser's finding it damaged, or that there was some deceit, etc.

RED-HOT SHOT: cannon-balls heated to redness, and fired from cannon at shipping magazines, wooden buildings, etc., to combine de-truction by fire with battering by concussion. In the great bombardment of Gibraltar 1782, Sep. 13, 14, red-hot shot was used with great effect by the defenders, under the gov., Gen. Elliott, the attacking squadron being completely silenced, and a large number of ships set on fire.

REDIGEST, v. *rē'dĭ-jĕst'* [*re*, again, and *digest*]: to digest or reduce to form a second time.

REDING, *rā'ding*, ALOYS VON: champion of Swiss independence: 1755–1818, Feb.; b. in the canton of Schwyz. After serving in Spain, he returned to Switzerland 1788. As capt.-gen. of the canton of Schwyz, he repulsed the French republicans, 1798, May 2, at Morgarten. After the formation of the Helvetic republic, R. was one of those who eagerly worked for the restitution of the old federal constitution. When, after the departure of the French, almost all the cantons declared themselves against the Helvetic govt., R. called a general diet at Schwyz, which assembled 1802, Sep. 27, and occupied itself with formation of a new independent constitution. R. went to Paris to win over the First Consul to the proposed change, but failed. The disarmament of the Swiss by a French army, and acceptance of the act of mediation, put an end to his hopes and to his political activity. In 1803 he officiated still as Landamman, or chief magistrate, of Schwyz; but after that retired into private life till 1809, when he was invested once more with the same dignity. In 1813 R. conducted the negotiations with the allies regarding the neutrality of Switzerland.

REDINGOTE, n. *rĕd-ĭng-gōt'* [F., corruption from Eng. *riding-coat*]: a long, plain, double-breasted outside cloak for ladies' wear.

REDINTEGRATION, n. *rē-dĭn'tē-grā'shŭn* [L. *redintegrātiōnem*, a renewal—from *re*, again; *in'tĕgro*, I make whole—from *intĕger*, whole: F. *réintégration*]: renovation; restoration to a whole or sound state; in *phil.*, a term used by many psychologists to explain the phenomena of the association of ideas.

REDISBURSE, v. *rē'dis-bĕrs'* [*re*, again, and *disburse*]: to repay or refund. RE'DISBOURSE', v. *-bôrs'*, in *OE.*, to repay; redisburse.

REDISCOVER, v. *rē'dis-kŭv'ĕr* [*re*, again, and *discover*]: to discover again.

REDISPOSE, v. *rē'dis-pōz'* [*re*, again, and *dispose*]: to dispose or adjust again.

REDISSOLVE, v. *rē'dĭz-zŏlv'* [*re*, again, and *dissolve*] to dissolve a second time.

REDISTRIBUTE, v. *rē'dis-trĭb'ūt* [*re*, again, and *distribute*]: to distribute again; to deal back again. RE-DIS'TRIBU'TION, n. *-bū'shŭn*, a dealing back; a second or new distribution.

RED-JACK'ET (SA-GO-YE-WAT'HA, Ind., 'He keeps them awake'): 1751–1830, Jan. 30; b. near Geneva, N. Y.: chief of the Wolf tribe of Seneca Indians. His English name was derived from a scarlet jacket which he wore in a foot-race. He succeeded Brant as the most important Indian in the Six Nations; fought on the British side in the revolutionary war, and on the American side in the second war with Great Britain; opposed the Fort Stanwix treaty 1784; signed a treaty 1792 and received from Washington a solid silver medal; and gave warning of the attempts of Tecumseh to draw the Six Nations into the western movement 1810. He was dignified in appearance, forcible and eloquent in council, hostile to the manners and customs of the whites, and an enemy to all missionary efforts. His remains were reinterred in Forest Lawn Cemetery, Buffalo, N.Y., 1884, Oct. 9, and a monument erected 1890.

REDOLENT, a. *rĕd'ō-lĕnt* [OF. *redolent*—from L. *rĕdŏlens* or *rĕdōlen'tem*, diffusing an odor—from *re*, back or again; *olēō*, I smell: It. *redolire*, to have a good smell]: having a sweet scent; diffusing fragrance. RED'O-LENTLY, ad. *-lĭ*. RED'OLENCE, n. *-lĕns*, or RED'OLENCY, n. *-lĕn-sĭ*, fragrance; perfume; sweet scent.

REDONDILLA, n. *rĕd-ŏn-dēl'ya* [Sp.]: the name given to a species of versification formerly used in s. Europe, consisting of a union of verses of four, six, or eight syllables, of which generally the first rhymed with the fourth, and the second with the third. At a later period, verses of six and eight syllables, in general in Spanish and Portuguese poetry, were called redondillas, whether they made perfect rhymes or assonances only. These became common in the dramatic poetry of Spain.

REDOUBLE, v. *rē-dŭb'l* [*re*, again, and *double*: F. *redoubler*]: to repeat often; to increase by repeated additions; to become twice as much. REDOUB'LING, imp. REDOUB'LED, pp. *-dŭb'ld*.

REDOUBT, n. *rē-dout'* [F. *redoute*—from It. *ridotto*; Sp. *reducto*, a redoubt—from L. *reductus*, drawn back—from *re*, back; *ducĕre*, to lead]: small fort of varying shape, constructed for a temporary purpose, and usually without flanking defenses. The term is vague in its acceptation, being applied equally to detached posts and to a strong position within another fortress. Redoubts as a general rule do not exceed 40 yards square, with 4 guns and a garrison of 320 men. They are square, pentagonal, and even circular. Each R. has parapet, ditch, scarps, banquette, etc., as in regular fortification; but it is commonly rather roughly constructed, haste and unprofessional labor precluding

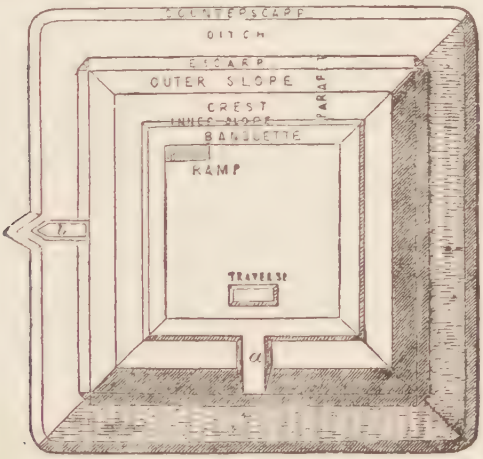


Fig. 1.

scientific accuracy. The entrance may be by a cutting through the parapet, as at *a*, in fig. 1, the cutting being covered within by a traverse; or, preferably, by an excavated gallery leading into the ditch, and thence by a ramp through the counterscarp. For the sake of flanking the ditch, and preventing an assaulting party from forming in it, caponieres of timber, loopholed, are sometimes formed, as at *b*; or, if the soil be stiff or chalky, a gallery may be cut behind the counterscarp, and loopholed toward the ditch. In some modern redoubts the line of each side is broken to afford flanking defense, as in fig. 2. Redoubts have the weak feature of not defending their own ditches, and of being approached at their salient

angles with comparative impunity. They are therefore not adapted to a protracted defense; but as temporary field-works, or in a war of posts, they are often of incalculable importance. Troops whose stability in the open field is doubtful are especially strengthened by redoubts in their line. Redoubts are useful, particularly in fortifying the tops of hills, or commanding passes, or where the object is to occupy a hostile territory, or to feel the way gradually through a wooded country. —R. is sometimes a general name for field-works entirely surrounding a post.

Fig. 2.

REDOUBTABLE, a. *rē-dowt'ă-bl*, or REDOUBT'ED, a. *-ĕd* [F. *redoutable*, formidable—from *redouter*, to fear or dread—from L. *re*, back; *dubitō*, I doubt]: terrible to foes; formidable; valiant.

REDOUND, v. *rĕ-downd'* [F. *redonder*, to redound: L. *redundārĕ*, to run or stream over—from *re*, back or again; *unda*, a wave: It. *ridondare*]: to be sent, rolled, or driven back; to conduce in the consequence or effect; to result; to contribute. REDOUND'ING, imp. REDOUND'ED, pp.

REDOUT KALÉ, *rā-dōt' kā-lā' :* port on the Black Sea coast, in the dist. Kutaïs of the Russian lieutenancy of Caucasia; in a marshy region at the mouth of a small river, about 12 m. n. of Poti. It possesses a Russian fortress of considerable strength. Pop. small.

REDOWA, n. *rĕd'ō-vä* [Bohem.]: a round dance, slow and graceful, in character similar to the polka or the mazurka; the tune played for such a dance.

REDPATH, *rĕd'path*, JAMES: journalist and social agitator: 1833, Aug. 24—1891, Jan. 10; b. Berwick-on-Tweed, England. He came to the United States 1848, became a writer on the New York *Tribune* 1852, and was connected with that journal 20 years. He travelled afoot through the seaboard states of the south 1853, studying the condition of the slaves. He was in Kansas as an observer and reporter of the exciting events of 1855, 6, and 7, in which he was active as a free-state partizan. He was with the armies of Sherman and Thomas throughout the war of secession; after the war he was commissioner of education of S. C., and organized the school system of the reconstructed state. He established a lecture bureau in Boston 1868, and conducted it successfully for several years. He went to Ireland 1881 to report on the famine then prevailing there; he was thenceforward an active partizan of the Irish national cause, and for some years published *Redpath's Weekly*, in the interest of the Irish home-rule agitation. He was editor of the *North American Review* 1886–88. He was during the last 4 years of his life deeply interested in the propagation of the sociological principles set forth in Henry George's *Progress and Poverty*. He published several books relating to the struggle in Kansas (including two on John Brown), and one on affairs in Ireland.

REDPOLL, or REDPOLE, n. *rĕd'pōl* [*red* and *poll*, head]: a small song-bird, with dark-crimson feathers on the crown, allied to the Linnet (q.v.).

REDRAFT, n. *rē-drăft'* [*re*, again, and *draft*]: a second draft or copy; a new bill of exchange which the holder of a protested bill draws on the drawer or indorsers: V. to draft or draw anew.

REDRAW, v. *rē-draw'* [*re*, again, and *draw*]: to draw again; in *commerce*, to draw a new bill of exchange; to draw or write a second draft or copy.

REDRESS, v. *rē-drĕs'* [F. *redresser;* It. *ridrizzare*, to straighten, to redress—from L. *re*, again; *dirigō*, I place or lay straight]: to rectify; to amend; to repair; to remedy; to relieve: N. a rectifying; an adjusting; remedy; deliverance from injury or oppression; amends. REDRESS'ING, imp. REDRESSED', pp. *-drĕst'*. REDRESS'ER, n. *-sĕr*, one who redresses. REDRESS'LESS, a. *-lĕs*, without redress or relief. REDRES'SIBLE, a. *-si-bl*, that may be relieved or repaired. REDRES'SIVE, a. *-sĭv*, affording relief.

RED RIVER: the southern large tributary of the Mississippi river. It rises in the great rainless plain of n.w. Texas, flows e. to long. 100°, where it deflects slightly to the s., forms the boundary between Tex. and the Ind. Terr. and Ark., and, passing through a portion of Ark. and La., by a tortuous course reaches the Mississippi 341 m. above its mouth. Its total length is about 1,550 m., and it drains about 91,000 sq. m. The plain in which it rises is about 2,450 ft. above sea-level. For about 100 m. from long. 102° it flows between rugged and almost perpendicular banks which rise 200 to 1,000 ft. The chasm is 5 to 20 m. wide, and the land, which is held by Indian tribes, is said to be productive. After leaving the cañon, the river flows through a sandy prairie to about long. 98°, where the width of the valley increases and timber-land appears. It then passes through a fine upland region to the Great Bend, where there is a sharp turn to the s. and the valley increases in width. After passing about 100 m., there is a deflection to the s.e., which course is continued till the Mississippi is reached. During the first 600 m. of its course, the river falls more than 2,200 ft., but for about the same distance from its mouth the fall is only 188 ft., and at high water the level is only about 50 ft. above that of the Gulf. Its width soon after emerging from the cañon is 2,700 ft., but is reduced to 1,800 ft. where it enters the Mississippi. In low water the river is very shallow at its mouth, admitting boats drawing no more than about 2 ft. of water; but from Dec. to July it is navigable for large boats nearly 1,250 m., and its tributaries are navigable 2,100 m. Much work has been done by the govt. to prevent the channel of the river from filling with sediment and thus causing the water to cut another course to the Gulf. The river derives its name from the color of its sediment. Its principal tributaries are the North Fork, Washita, Little River, and Black, on the left; and the Pease and Big Wichita on the right. The region of this river was the scene of a great but unsuccessful land and naval expedition by the federal troops in the civil war.

RED RIVER OF THE NORTH: river rising in a cluster of lakes in w. Minnesota, near the sources of the Mississippi, and flowing n., separating Minn. from Dak., into the British possessions, and emptying into Lake Winnipeg after a course of about 500 m., watering a beautiful country, and receiving numerous branches, chief of which are the Cheyenne, the Pembina, and the Assiniboine: see MANITOBA.

RED RIVER SETTLEMENT: see MANITOBA.

RED ROOT (*Ceanothus*): genus of plants of nat. order *Rhamnaceæ*, consisting of deciduous shrubs with simple alternate leaves and large red roots, whence their common name. The common RED ROOT of N. America (*C. Americanus*), abundant from Canada to Fla., is a shrub 2–4 ft. high, with beautiful thyrsi of numerous small

white flowers. It is sometimes called *New Jersey Tea*, an infusion of its leaves being sometimes used as tea. It serves also as an astringent, and for dyeing wool of a cinnamon color. A Mexican species has blue flowers, and a Californian kind is used for evergreen hedges.

REDRUTH, *rĕd rŭth:* town of Cornwall, England, consisting chiefly of one long street, on a hill, in the centre of a famous mining district, 9½ m. n.w. of Falmouth. Iron foundries are in operation; but the principal product of this vast mining district is copper. By railway, there is easy communication to St. Ives and Falmouth bays. Pop. (1881) 9,335; (1891) 10,324.

RED SAND STONE: term formerly applied to the combined Devonian and Permian rocks, when their relations to the Carboniferous strata were unknown. The discovery that one set of the R. S. was below the coal, while the other was above it, caused their division into the Old Red (q.v.), or Devonian, and the New Red, or Permian (q.v.). The term R. S. is now disused by most geologists: see DEVONIAN AGE.

RED SEA, or ARA'BIAN GULF: inlet of the Indian Ocean, in form a long and narrow gulf, stretching n.w. from the Strait of Bab-el-Mandeb (lat. 12° 40′ n.), by which it communicates with the Gulf of Aden, to the Isthmus of Suez (lat. 30° n.), which parts it from the Mediterranean Sea. It separates Arabia on the e. from Egypt, Nubia, and Abyssinia on the w.; extreme length more than 1,400 English m.; breadth varying greatly—from about 20 m. at the Strait of Bab-el-Mandeb to more than 230 at about lat. 16° 30′. At Râs (Cape) Mohammed (lat. 27° 40′ n.), the sea is parted into two arms or smaller gulfs, which inclose between them the peninsula of Mt. Sinai. That on the w., continuing the direction of the main body of the sea, is the Gulf of Suez (Bahr-es-Suweis), of which the Strait of Jubal or Jublah forms the entrance; its length is about 180 m.; extreme breadth (about lat. 29°) more than 30 m. The e. arm, the Gulf of Akabah (Bahr-el-'Akabah), is entered by the Strait of Tirân, and extends n.n.e. to lat. 29° 30′ n.; length more than 100 m.; greatest breadth rather more than 15. The depth of the R. S. varies considerably, but is in many places very great; the deepest sounding is marked as 1,054 fathoms, lat. 22° 30′. S. of 16°, it is comparatively shallow; but the shallowest part of the whole sea is the Gulf of Suez, which decreases in depth from 40 or 50 fathoms at the entrance to 3 fathoms in Suez Harbor, at the n. end, where the gulf, which is supposed in ancient times to have extended considerably farther n., has apparently been filled up by the sand washed up by the strong tides, or drifted in by winds. The Gulf of Akabah is much deeper; it is, in fact, a narrow, deep ravine, with steep and rocky sides, forming the termination of the long valley of the Arabah, running n. to the Dead Sea. The basin of the R. S. itself is the lowest portion of the deep valley lying be-

tween the highlands of Africa on the w. and the lofty plateau of the Arabian hills on the e., which latter, rising at some little distance inland, leave mostly a sandy and sterile tract along the sea. The navigation of the R. S. has always been accounted difficult and dangerous, owing to the prevalence of violent winds, and the number of islands, shoals, and coral reefs, which line the shores. These coral reefs extend generally in parallel lines along the coast; they abound in all parts, but are frequent especially on the Arabian side, where the navigation is consequently very intricate. The coral is very beautiful, often red or reddish in color, but usually white. The islands generally occur singly, but between the parallels of lat. 15° and 17° they are found massed in two groups—the Farsan (q.v.) Islands on the e., and the Dhalac (q.v.) Islands on the w. side. In mid-channel, s. of Râs Mohammed, there is generally a width of 100 m. clear. Along this channel, the winds are constant throughout the year in one of two directions: from May to October, the n.w. monsoon blows; for the rest of the year the s.e. is the prevailing wind, and the water in the n. part of the sea is then raised to a higher level than the Mediterranean. It had been generally supposed that the level of the R. S. was more than 30 ft. higher than the Mediterranean: but it is now known, from careful observations, that the ordinary levels of the two seas are the same. The principal ports are, on the Arabian side, Mocha, Jiddah (port of Mecca), and Yembo (port of Medinah); on the w., Suez, Cosseir, Suakin, and Massowah. The origin of the name R. S. has given rise to a variety of conjectures, and has never been settled. It is supposed to have been so called from the name Edom (Red), as the mountains of that country are washed by the waters of the Gulf of Akabah; from the red and purple coloring of the rocks which in some parts border it; from the red color sometimes given to the waters by animalcules and sea-weed; or from the reddish tinge imparted in some places by the subjacent red sandstone and reddish coral reefs. To the Hebrews, it was known as *Yam Sûph*, sea of *weeds* or *sedge*. By the Greeks, in the earliest times, the name R. S. was given to the whole Indian Ocean, including both the R. S. and the Persian Gulf, and not distinctively to the former (which was then and afterward known as the Arabian Gulf), though the name, in later times, gradually became restricted in its application.

From the earliest times, the R. S. has been a great highway of commerce between India and the Mediterranean lands, and traversed successively by Egyptians Phœnicians, Hebrews, and Arabs. It is mentioned first in the Book of Exodus, on occasion of the passage o the Israelites, supposed to have taken place a little s of the present town of Suez. The first recorded naviga tion of the sea was in the time of Sesostris, B.C. 14th c Three centuries later, Hebrew and Phœnician ship

traversed the R. S. on the voyage to Ophir, from the port of Ezion-geber, at the head of the Gulf of Akabah. The Gulf of Suez was for many centuries apparently the seat of the Egyptian trade in this sea and to India. After the foundation of Alexandria, and during the dynasty of the Ptolemies and the Roman dominion, the trade with India was vigorously carried on, though the chief seat of traffic was moved farther s., to the towns of Berenice and Myos Hormos, which sent out annually large fleets to India. After the establishment of the Mohammedan empire, 7th c., an important trade with India and China seems to have been carried on through the R. S., and through it, between the 12th and 15th c., the goods of the East passed to the Venetian factories in Alexandria, until the discovery of the route round the Cape of Good Hope diverted the traffic with India into a different channel, and put an end to the commerce of the Red Sea. Since the establishment of the so-called Overland Route to India, and the opening of the Suez Canal 1870, the R. S. has regained importance as the highway of commerce between Europe and the East: see SUEZ. Italy has acquired a station on the w. coast of the Red Sea, at Assab, near Bab-el-Mandeb. France has four: Obock (for the Abyssinian trade), Dessi (island at Amphila Bay), Adulis, and the peninsula of Sheik Said.

For the classical geography of the R. S., see *Geographi Graeci Minores* of Müller (Paris 1855), Kiepert's *Anc. Geography* (1881), and Bunbury's *History of Anc. Geography* (1879); also the *Travels* of Niebuhr, Salt, Burckhardt, Rüppell, and others.

REDSEAR, v. *red sēr* [*red*, and *sear*, to wither]: to heat iron to such redness that it will crack or break under the hammer—that is, the iron will become *withered*, or without cohesion of parts.

REDSHANK, n. *red shaungk*: a bird like a plover, with red legs. REDSHANKS, a nickname formerly given to the Highlanders of Scotland, from their bare legs.

REDSHID PASHA, *red-shēd pā-shā'*: Turkish statesman, long the chief of the party of progress in Turkey: about 1800–1858, Jan. 7; b. Constantinople. He obtained the post of chief sec. in one of the govt. offices at Constantinople. On the outbreak of the Russian war (1828-9), he was charged with a mission in Bulgaria, and exerted himself effectually to protect the Christian subjects of the Porte from the fanatic rage of their Moslem neighbors; and on his return obtained from Mahmud, who appreciated his character, a post in the foreign office. On the creation of resident legations at foreign courts, R. was sent to the courts of France and Britain, and applied himself diligently to study of the language, manners, and political constitution of these countries; but was recalled 1837, and nominated grand-vizier. His persuasive eloquence and firmness of character greatly aided the sultan in the better centralization of the ad-

ministration, and in establishing mercantile intercourse with foreign nations; but the old Turkish party was still too strong, and he was compelled to resign office, and return to Paris and London to support the Turkish against the Egyptian interests. By the death of the sultan, and the disaster of Nisib, he was recalled to his old post, the foreign office. The effects of his foreign diplomacy were soon apparent in the humiliation of the Egyptians in Syria; but a seraglio intrigue occasioned his dismissal. 1841–45 he was Turkish representative at the French court, and though recalled to fill the post of grand-vizier 1846, Sep. 28, he found his influence at court greatly diminished under the new sultan. He was vigorously supported by Sir Stratford Canning, English ambassador, who was of the opinion that all hopes of a bright future to Turkey depended solely upon Redshid Pasha. He was frequently deposed, and almost immediately recalled, according as the anti-reform party gained or lost the ear of the sultan; but the complications with Russia 1853 threw the anti-reformers into discredit, and R., more powerful than ever, was again recalled to the direction of foreign affairs. In 1854 he was again overcome by his political opponents, and retired from office, which he did not resume till after the peace of Paris. His reappointment as grand-vizier excited great hopes of further salutary reformations; but the French influence at the Porte was pertinaciously antagonistic, and he was twice forced to resign, and as often recalled. At last, worn out with harassing cares and toil, he died at his palace of Emmirgian.

RED SNOW: phenomenon—which, as seen from a distance, is often an effect of light—which adds a peculiar charm to mountain and winter landscapes, particularly in the mornings and evenings, when the rays of the sun fall most obliquely on the surface of the snow. But snow is occasionally found both in polar and alpine regions of a really red color. This phenomenon seems to have been observed by the ancients, as a passage in Aristotle apparently refers to it; but it attracted no attention in modern times till 1760, when Saussure observed it in the Alps, and from chemical experiments concluded that the red color was owing to some vegetable substance, which he supposed might be the pollen of a plant. The next observations on R. S. were in the arctic expedition under Capt. Ross, when it was found extending over a range of cliffs on the shore of Baffin's Bay for 8 m.—the red color penetrating the snow in some places to a depth of 12 ft. On the return of the expedition 1819, the coloring matter, as then existing in the melted R. S., was subjected to careful examination by Robert Brown and by Francis Bauer, the former most eminent botanist pronouncing it to be a unicellular plant of the order *Algæ*, while the latter referred it to *Uredo*, genus of *Fungi*, and called it *U. nivalis*. Baron Wrangel afterward declared it a *Lichen*, and called it *Lepraria kermesina;* but the earlier opinion of Brown

has been confirmed, and the plant is generally known by the name *Protococcus nivalis*, given to it by Agardh, or *Palmella nivalis*, given to it by Sir William Hooker. The motions of this microscopic plant in the earlier stages of its existence led some of the earlier naturalists to regard the organisms which they found in red snow as animalcules: see PALMELLACEÆ. That the phenomenon is due to vegetable life is beyond question; still, animal life may exist with it, and real animalcules may have been observed. The R. S. plant consists, in its mature state, of brilliant globules like fine garnets, seated on, but not immersed in, a gelatinous mass.

RED'START (*Setophagà ruticilla*): bird of the Warbler family, *Sylvicolidæ*, but having a bill like that of the Fly-catchers. It is 5½ in. in length, the male mostly black; the sides, and the basal third of quills of the wing and tail, are chestnut-red, these parts being yellow in the female, and the other parts olive instead of black. It is not uncommon east of the great plains, and is interesting for its beauty and lively habits. The European R. (*Ruticilla phœnicura*) belongs to another sub-family, and is very different in coloring, the male in summer having the head, back, and wing-coverts gray; the forehead white, with narrow black band at the base of the

Redstart (*Ruticilla phœnicura*).

bill; throat, sides of the neck, and face jet black; wings brown; tail and upper tail-coverts bright rufous chestnut, with a strip of dark brown on the centres of the two middle feathers; the rest of the under parts mostly pale chestnut. The female is grayish brown, with neither the white nor the black on the head, and less red on the tail. The R. is widely diffused over Europe, Asia, and n. Africa. It has a very soft melodious song, continued during the breeding season far into the night and resumed at early dawn. In confinement it becomes very tame and has been known to imitate the song of other birds, and even to learn a tune.

REDSTREAK, n. *rĕd strēk*: a variety of apple; cider made from the redstreak apple.

RED'TAIL: same as REDSTART.

RED-TAPE, RED-TAPISM: see under **RED**.

REDUCE, v. *ré-dūs'* [L. *redu'cĕrĕ*, to lead or bring back—from *re*, back; *duco*, I lead; *ductus*, led: It. *reducere:* F. *réduire*]: to bring into any state, particularly one made less or diminished; to degrade; to lessen; to subdue; to conquer; to class or arrange; to impoverish; to bring down; to make less in size, quantity, or value: in *arith.*, *alg.*, and *logic*, to bring from a form less fit, to one more fit, for operation: in *metallurgy*, to convert an oxide or an ore into the metallic state, as by smelting (see below): in *surg.*, to restore to its proper place or state, as a dislocated bone: in *OE.*, to bring back; to bring to the former state; to reclaim to order. **REDU'CING**, imp. **REDUCED'**, pp. *-dūst'*. **REDU'CER**, n. *-dū'sĕr*, he who or that which reduces. **REDU'CENT**, a. *-sĕnt*, tending to reduce: N. that which reduces. **REDU'CIBLE**, a. *-sĭ-bl*, that may be brought into another state. **REDU'CIBLENESS**, n. *-bl-nĕs*, quality of being reducible. **REDUCT'**, n. *-dŭkt*, in *arch.*, a small piece or place taken out of a larger to render it more uniform and regular, or for some other convenience; a quirk. **REDUC'TION**, n. *-dŭk'shŭn* [F. *réduction*—from L. *reductiōnem*]: act of reducing or state of being reduced; diminution; conquest: operation of separating a metal from the ore (see **REDUCTION**, in Metallurgy): in *arith.*, operation of changing from one denomination into another without altering the value; in the reduction of a quantity from a higher to a lower denomination, the process of multiplication is employed; contrarily, division is the needful process when a number of a lower denomination is to be reduced to an equivalent number of a higher: in *alg.*, operation of solving an equation by bringing the unknown quantity to the one side, and the known quantities to the other: collection of observations to obtain a general result: in *logic*, process of converting a syllogism from one of the so-called imperfect moods to a mood in the first figure: in *chem.*, deoxidation: in *anat.*, operation of restoring a dislocated or fractured part to its former place: in *Scotch law*, the annulling of a deed or instrument, thereby annihilating its legal effect—the action to this end being raised only by some person having some title or interest in the matter. **REDUC'TIVE**, a. *-tĭv* [F. *réductif*]: having the power to reduce: N. that which reduces. **REDUC'TIVELY**, ad. *-lĭ*. **TO REDUCE TO THE RANKS**, to degrade for misconduct, as a sergeant to the position of a common soldier.—**SYN.** of 'reduce': to degrade; impair; lower; diminish; lessen; decrease; abate; curtail; shorten; subject; conquer; subjugate; subdue.

REDUCTIO AD ABSURDUM, phrase. *re-dŭk'shi-ō ăd ăb-sĭr'dŭm* [L.]: reduction to an absurdity: a species of argument which proves not the thing asserted, but the absurdity of everything which contradicts it. It is much used in geometry. In this way the proposition is not proved in a direct manner by principles before laid down, but it is shown that the contrary is absurd or impossible; and thus the truth of the proposition is demonstrated indirectly. This method of demonstration is frequently termed *indirect*.

REDUCTION, n. Metallurgy: operation of separating a metal from the condition of a chemical compound in which it exists as an ore. This is generally effected either by the direct action of heat, or by heating the compound together with a *reducing agent*. Thus, when oxide of mercury is simply heated, the oxygen is given off as gas, and mercury or quicksilver appears as metal. Again, when sulphuret of lead is heated with iron, sulphuret of iron is formed, and the lead is reduced to its metallic state: in this case the iron is the reducing agent. The principal reducing agent employed in metallurgy is carbon, or rather the gas carbonic oxide, which is formed under certain conditions when carbon is burned. See METALLURGY: IRON.

RÉDUIT, n. *rad'wē* [F. *réduit*, from *réduire*—from L. *reducere*, to reduce]: in *fortification*, small fortified work within a larger; a central or retired work intended to afford the garrison a last retreat, where they may hold out, or whence they may capitulate. It is usually of masonry, loopholed, and often circular. Many engineers doubt the use of réduits, as blocking up the working space, being themselves inconvenient for the men, and incapable of protracted defense, while they frequently mask the fire of other works more to the rear. R. is also the same as Redoubt (q.v.).

REDUNDANT, a. *rē-dŭn'dănt* [L. *rĕdun'dans* or *rĕdundan'tem*, running back or over—from *re*, back; *unda*, a wave: F. *rédondant*]: overflowing; excessive; exceeding what is natural or necessary. REDUN'DANTLY, ad. *-lĭ*. REDUN'DANCE, n. *-dăns* [F. *rédondance*—L. *rĕdundan'tia*], or REDUN'DANCY, n. *-dăn-sĭ*, the quality of being redundant; that which is redundant or in excess. —SYN. of 'redundant': superabundant; exuberant; superfluous; excessive; copious; overflowing; plentiful.

REDUPLICATE, v. *rē-dū'plĭ-kāt* [L. *reduplicātus*, doubled again—from *re*, again; *duplico*, I double: It. *reduplicare*]: to double again: ADJ. double; in *bot.*, applied to a form of æstivation in which the edges of the sepals or petals are turned outward. REDU'PLICA'TION, n. *-kā'shŭn*, the act of doubling again. REDU'PLICATIVE, a. *-kā-tĭv*, double.

RED'-WATER (known also as Bloody Urine and Hæmaturia): disease of cattle, and occasionally of sheep; arising from eating coarse, indigestible, innutritive food, continued exposure to inclement weather, and other such causes, which lead to a deteriorated state of the blood. It affects cattle of all ages and of both sexes, and often proves fatal. The appetite and rumination are irregular, the bowels become constipated, and the urine reddened with the broken-down red globules of the blood. In advanced stages the urine contains so much albumin and iron as to become nearly black. The food should consist of hay, with bran mashes and a little oil meal. A full supply of pure water is essential. Mild laxatives should be given to relieve constipation. In severe cases a veterinarian should be promptly called. The disease is more easily prevented than cured.

RED WING: city, cap. of Goodhue co., Minn.; on the Mississippi river and the Chicago Milwaukee and St. Paul and the Minneapolis and St. Louis railroads; 40 m. e.-by-s. of St. Paul. It contains an opera-house, music hall, several churches and schools, 1 national bank (cap. $100,000), 2 state banks, 1 private bank, and 1 daily and 2 weekly newspapers. There are several flour and steam saw-mills, and manufactories of sewer pipe, stoneware, furniture, etc. It is the wheat market for a large region. Pop. (1880) 5,876; (1890) 6,277.

RED'WING (*Turdus iliacus*): species of Thrush (q.v.); in Britain a winter bird of passage, spending the summer in northern parts of Europe and Asia, and even in Iceland: its winter range extends to the Mediterranean. It is somewhat smaller than the Song Thrush or Mavis. The general color is a rich clove-brown on the head,

Redwing (*Turdus iliacus*).

upper parts of the body, and tail; wing-feathers darker, but with lighter external edges; lower parts mostly whitish, tinged and streaked with brown; under wing-coverts and axillary feathers bright reddish orange. The R. arrives in Britain rather earlier than the Fieldfare (q.v.), and, like it, congregates in large flocks. It has an exquisite song, which it pours forth from the

summit of a high tree, gladdening the northern forests. In N. America, the name R. is sometimes used as an abbreviation for the R. Blackbird.

RED'WOOD: see SEQUOIA.

RED'WOOD: heart-wood of *Adenanthera pavonina* (*Leguminosæ*), large tree growing in India, where it is called *Rakta-chandan*, and is much used in dyeing red.

REE: see REI.

REE, *rē*, LOUGH: lake in the middle of Ireland, between Connaught on the w. and Leinster on the e., an expansion of the river Shannon (q.v.).

RE-ECHO, v. *rē'-ĕk'ō* [*re*, again, and *echo*]: to echo back; to return back or be reverberated, as an echo.

REECHY, a. *rēch'ĭ* [Ger. *rauch;* Sw. *rök;* Icel. *reykr*, smoke (see also REEK)]: in *OE.*, sooty; smoky; tanned.

REED, n. *rēd* [Dut. *riet;* Ger. *ried;* AS. *hreod*, a reed —probably so called from their rustling or whispering sounds: Fin. *rytista*, to rustle; *ryti*, a reed: Skr. *ru*, to sound as shaken with the wind]: name common to many aquatic plants which have jointed hollow stems (see below): tongue-pieces of certain wind-instruments: certain stops in an organ (see REED, in Music): that part of a loom which keeps the threads apart in the operation of weaving (see LOOM). REED'ED, a. covered with reeds; formed with channels and ridges like reeds. REED'Y, a. *-ĭ*, abounding with reeds: sounding as a reed—that is, like a harsh thick voice. REED'LESS, a. *-lĕs*, without reeds. REED-BUNTING, a small perching or insessorial bird found in fens, etc. REED-GRASS, *Arundo phragmites*, ord. *Gramina*, *or*. REED-MACE, the plant cat's-tail (see TYPHA). REED-PIPE, a musical pipe furnished with a reed. REED WARBLER: see WARBLER.

REED: common name of certain tall grasses, growing in moist or marshy places, and having a very hard or almost woody culm. The COMMON R. (*Phragmites communis*, formerly *Arundo phragmites*) is abundant in N. America and Europe, in wet meadows and stagnant waters, and by the banks of rivers and ditches. It grows chiefly in rich alluvial soils. The culms are 5–10 ft. high, bearing at the top a large much-branched panicle, of reddish-brown or yellowish color, having a shining appearance from numerous long silky hairs which spring from the base of the spikelets. The two outer glumes are very unequal; and the spikelet contains 3–4 perfect florets, with a barren one at the base. In Europe, the culms, or stems, are used for making garden-screens, for light fences, for thatching houses and farm-buildings, for making a framework to be covered with clay in partitions and floors, for battens of weavers' shuttles, etc. So useful are reeds in these ways, particularly for thatching, that it is profitable in some places to plant them in old clay-pits, etc. In the fenny districts of e. England, the plant covers large tracts called *reed-ronds*.—Nearly

allied to this is Reed Canary Grass (*Phalaris arundinaria*), the striped variety of which is cultivated for ornament; and, of gigantic size, the Large Cane (*Arundinaria macrosperma*), 10–20 ft. high, forming the canebrakes of the southern states; also the Smaller Reed (*A. tecta*) of the south, 4–10 in., and *Arundo donax*, largest of European grasses, plentiful in s. Europe, and found in marshy places as far n. as the south of the Tyrol and of Switzerland, 6–12 ft. high, and having very thick, hollow, woody culms, and a purplish-yellow panicle, silvery and shining from silky hairs. The woody stems are an article of commerce, used by musical-instrument makers for reeds of clarionets, mouthpieces of oboes, etc. They are also made into walking-sticks and fishing-rods. The creeping roots contain much farina and some sugar.—*Arundo karka* is supposed to be the grass called *Sur* in Sinde, of which the flower-stalks are very fibrous; and the fibres, being partially separated by beating, are twisted into twine and ropes.—The Sea Reed is *Ammophila* (q.v.)—or *Psamma—arundinacea*.

REED, in Music: mouthpiece of a hautboy, bassoon, or clarionet. Also, a piece of metal with a brass spring or tongue attached to it in such a way that the admission of a current of wind causes it to vibrate and sound a musical note. The reed is of two kinds, *beating* and *free*. The former is used in the reed-pipes of an Organ (q.v.), and requires to be placed within a tube to produce a musical sound. It consists, as in fig. 1, of a metallic cylinder, *a*, with the front part cut away, and a brass spring or tongue, *b*, placed against the opening, and attached at the upper end. The admission of air to the pipe in which the reed is placed causes its tongue to vibrate against the edge of the opening, so as to cover and uncover the slit, through which the air passes to the pipe above, the regularly repeated beat producing a musical note, dependent for its pitch on the length of the tongue, which is regulated by a strong spring of wire, *c*, pressing against it. The quality of the sound is determined to a large extent by the length and form of the pipe in which the reed is placed. The *free* reed differs from the beating reed in this, that the tongue is a little smaller than the opening, and strikes, not the edge of the opening, but the air. The admission of a current of wind causes it to yield so as to let the air pass, while, after recovering its position, it is carried back by its momentum equally far on the other side, and continues vibrating so long as the current of air is continued, the result of the pulsations being a musical note. The invention of the free reed has been ascribed to Grenié, a Frenchman, who brought it into use; but it has been long known to the Chinese. Its note is more smooth and mellow than that of the beating reed, and it has the

Fig. 1.

Refectory of the Monastery of Maulbronn, erected 1215–1230.

advantage of not requiring a pipe, which is a necessary appendage to the latter. Besides being occasionally adapted to organ-pipes, it is used without a pipe in the

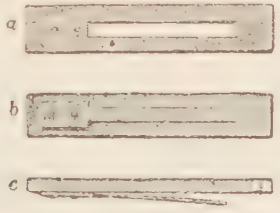


Fig. 2.

Harmonium (q.v.), as represented in the subjoined fig. 2, where *a* is the brass frame containing the slit, *b* the reed in the frame, while *c* represents the position of the reed in the instrument, it being a little below the slit, when not in motion.

REED, Joseph: statesman: 1741, Aug. 27—1785, March 5; b. Trenton, N. J. He graduated at Princeton Coll. 1757; studied law, and was admitted to the bar 1763; continued his law studies 2 years in London; returning home 1765 and beginning the practice of law in Trenton. He was made deputy sec. to the gov. of N. J. 1767. He removed to Philadelphia 1770; and took part in the political agitation of the time, on the popular side. He was chosen pres. of the 2d provincial congress 1775. The same year he gave up his law business to accept the post of military sec. to Gen. Washington; was appointed adjt.gen. of the Amer. army 1776. He declined, 1777, first a brig.-generalship, with command of all the cavalry forces; secondly, the chief-justiceship of Penn.—preferring to remain on Washington's staff as a volunteer aide. As such he rendered brilliant service at Brandywine, Germantown, and Monmouth. Elected to the continental congress 1777, he chose rather to remain in the army; but on being elected a second time the same year, accepted the place: he was chairman of a committee appointed to confer with Gen. Washington. He was pres. of the supreme executive council of Penn 1778–81, and as such aided in founding the Univ. o Penn. He took a leading part in presenting charges against Benedict Arnold. He returned to the practice of law 1781. R. visited England for his health 1784; and though the story is familiar of his impressively refusing a great bribe offered him by the king to use his influence against the interest of the Amer. colonies, his enemies charged him with meditating treachery against his country. The charge was, by George Bancroft, the historian, for a time deemed proved; but it was later shown that the intending traitor was Col. Charles Read.

REED, THOMAS BRACKETT, LL.D.: born Portland, Me., 1839, Oct. 18. He graduated from Bowdoin College 1860, taught school and studied law, served for a short time in the civil war as asst. paymaster in the U. S. navy, and was admitted to the bar and commenced practice in Portland 1865. He soon entered political life, became noted as a speaker and debater, and was elected to the lower house of the Maine legislature 1868. The following year he was re-elected, and 1870 became a member of the state senate, but was soon elected atty.gen. of the state—youngest man ever chosen to that office—which position he held three years. He was city solicitor of Portland three years, and has been a member of the national house of representatives since 1876—his present term to expire 1897. He soon became prominent in the proceedings of the house by his force and promptness, and for many years has been one of the leading republican members. He was elected speaker 1889, Dec. 2, by various rulings came in conflict with a powerful obstructive minority, and secured 1890, Feb. 14, the adoption of new rules enabling the majority to proceed with legislative business. He has contributed to the *North American Review* and other periodicals. He was again elected speaker 1895 and was one of the leading candidates for the republican presidential nomination, receiving 84½ votes in the St. Louis convention 1896.

REED, WILLIAM BRADFORD: lawyer: 1806, June 30—1876, Feb. 18; b. Philadelphia; son of Joseph R. On graduating at the Univ. of Penn. 1825, he went to Mexico as private sec. of Joel R. Poinsett. On his return he studied law; became atty.gen. of Penn. 1838; was appointed prof. of Amer. history in the Univ. of Penn. 1850. He was U. S. minister to China 1857–60, and negotiated a highly advantageous treaty. He settled in New York 1860. He was a frequent contributor of historical and political essays to the periodical press, and was author of *Life and Correspondence of Joseph Reed*, in which he vindicated his father's fair fame as a patriot.

RE-EDIFY, v. *rē-ĕd'i-fī* [*re*, again, and *edify*]: to edify again; to rebuild.

REEF, n. *rēf* [Ger. *riff*, a reef of rocks: Icel. *hrifa*, a rake; *rif*, a reef: Dut. *rieve* or *rieffe*, a rake or comb; *rif*, a reef: Sw. *ref*, a reef of rocks]: a chain or ridge of rocks lying at or near the surface of the water, or projecting but a little way above it, at full tide—improperly applied to a projecting sand-bank or spit of sand; a *shoal* or *bank* occupies a wider area than a *reef*, and is for the most part composed of soft material, as mud, sand, and gravel. REEF'Y, a. *-ĭ*, full of reefs. REEF'ER, n. one who by land-signals misleads a vessel in distress to come among the reefs or rocks for the sake of obtaining plunder by its wreck. CORAL-REEF: see under CORAL.

REEF, n. *rēf* [Dut. *reef*, a reef—akin to *rieffe*, a rake or comb: Ger. *reef;* Gael. *riob* or *riof*, a reef]: row of short ropes stretching across a sail for the purpose of

Wherry with foresail reefed, the mainsail showing reef-bands and reef ties.

tying the strip of sail above the *reef* up to the yard, and so diminishing the size of the sail when the wind becomes boisterous; when loose the short ropes hang

Reefing a Sail.

against the sail like the teeth of a comb, whence apparently the name. The term R. is applied also to the portion of the sail which is folded together by the use of the short ropes. When the intention is to take in a R., the sail is slightly lowered; the men climb out along the yard or boom below its lower edge, fold the loose sail on the yard, and fasten the reefing-lines securely round the yard and sail thus folded. There are in some ships systems of small ropes by which the sail may be reefed from the top without the men incurring the danger of going out on the yard in tempestuous weather

REEF, v. to reduce the exposed surface of a sail by tying a row of short ropes around a portion of the sail and the yard, or by tying together two parallel rows of short ropes which hang loosely on the sail. REEF ING, imp. REEFED, pp. *rēft.* REEF'ER, n. *-ėr;* one who reefs—a name often applied to midshipmen: reefing-jacket. REEF-BAND, the cross-piece of canvas in which the reef-holes are formed.

REEK, n. *rēk* [AS. *rec;* Icel. *reykr;* Ger. *rauch;* Dan. *rög;* Dut. *rook,* smoke]: smoke; steam; vapor: V. to give out smoke; to steam; to exhale. REEK ING, imp.: ADJ. emitting vapor. REEKED, pp. *rēkt.* REEKY, or REEKIE, a. *rēk'i,* smoky; soiled with smoke or vapor. AULD REEKIE, a name applied to Edinburgh.

REEL, v. *rēl* [Scot. *reile,* to roll the eyes: Swiss, *riegeln,* to rattle, to wriggle: Sw. *ragla,* to reel, to stagger]: to move unsteadily like a drunken man. REEL ING, imp.: N. a staggering; a vacillating walk. REELED, pp. *rēld.*

REEL, n. *rēl* [Gael. *righil,* a wheel, a reel]: in *Scot.,* a lively dance in which three or four dancers in a row, or a greater number, twist in and out and round each other. The music is in general written in common time of four crotchets in a measure, but sometimes in jig time of six quavers.

REEL, n. *rēl* [Scot. *reil,* a confused motion: Low Ger. *rallen,* to make a noise as children at play: Dan. *vraale,* to squall]: frame turning on an axis, on which yarn, thread, etc., are wound: broad thick stem having flat thick heads, on which thread is wound when sold for use (see REEL-WINDING MACHINE); a bobbin: instr. attached to a fishing-rod, on which the line is wound: V. to gather yarn off the spindle. REEL'ING, imp.: N. the process of winding thread, cotton, silk, etc., into a skein. REELED, pp. *rēld. Note.*—The three preceding entries are etymologically connected.

RE-ELECT, v. *rē'-ē-lēkt'* [*re,* again, and *elect*]: to elect again. RE-ELEC'TION, n. an election a second time.

RE-ELIGIBLE, a. *rē'-ėl'i-ji-bl* [*re,* again, and *eligible*]: capable of being elected again to the same office. RE-EL'IGIBIL ITY, n. *-bil'i-ti,* the capacity of being elected again to the same office.

REEL-WINDING MACHINE: contrivance used by manufacturers of sewing-thread, for winding the thread on to the reels on which it is sold for use; and not only does it turn a number of reels round so as to wind the cotton upon them, but, by a peculiar arrangement, every turn is so managed that the cotton is reeled with beautiful regularity, each turn of the thread being laid on by the side of the previous one, and never crossing it.

RE-EMBARK, v. *rē'-ėm-bärk'* [*re,* again, and *embark*]: to embark or go on board ship again; to put on board again. RE-EM'BARKA'TION, n. a putting on board or a going on board again.

RE-EMBODY, v. *rē-em-bod'i* [*re*, again, and *embody*] to embody again.

RE-EMBRACE', v. *rē-em-brās'* [*re*, again, and *embrace*]: to embrace again.

RE-EMERGE', v. *rē-em-ėrj'* [*re*, again, and *emerge*]: to appear again after being plunged, obscured, or overwhelmed.

REEMING, n. *rēm'ing* [perhaps L. *rīma*, a cleft, a fissure]: in a *ship*, the act of opening the seams between the planks by caulking-irons in order to recaulk them.

RE-ENACT, v. *rē'-ĕn-ākt'* [*re*, again, and *enact*]: to pass again, as a law. RE'-ENACT'MENT, n. the enacting or passing a law a second time.

RE-ENFORCE: see REINFORCE.

RE-ENGAGE', v. *rē-en-gāj'* [*re*, again, and *engage*]: to engage a second time. RE'-ENGAGE'MENT, n. a second or renewed engagement.

RE-ENJOY, v. *rē'-ĕn-joy'* [*re*, again, and *enjoy*]: to enjoy anew, or a second time.

RE-ENKINDLE, v. *rē-en-kin'dl* [*re*, again, and *enkindle*]: to enkindle again.

RE-ENLIST, v. *rē'-ĕn-list'* [*re*, again, and *enlist*]: to enlist again. RE'-ENLIST'MENT, n. a new or second enlistment.

RE-ENTER, v. *rē-en'tėr* [*re*, again, and *enter*]: to enter again or anew; in *engraving*, to deepen lines with the graver. RE-EN'TERING, imp. RE-EN'TERED, pp. *-tėrd*. RE-EN'TRY, n. *-trĭ*, an entering again: in *law*, the resuming or retaking possession of lands, as when a landlord, according to the terms of his lease, takes possession of the premises in certain conditions—e.g., nonpayment of rent after a specified period. But, for reentry, all the conditions must be strictly complied with. RE-EN'TRANCE, n. *-trāns*, the act of entering again. RE-ENTERING ANGLE, in *fort.*, angle of a work whose point turns inward toward the defended place—e.g., the flanks of a bastion make re-entering angles with the adjoining curtains. Advantage is commonly taken of the comparatively sheltered position of these angles to form *places d'armes* for assembly of troops.

RE-ESTABLISH, v. *rē'-es-tăb'lish* [*re*, again, and *establish*]: to establish anew; to fix or confirm again. RE'-ESTAB'LISHING, imp. RE'-ESTAB'LISHED, pp. *-lisht*. RE'-ESTAB'LISHMENT, n. restoration; renewed confirmation.

REEVE, v. *rēv* [from Eng. *rive;* Icel. *rifa*, to tear asunder; Dan. *rōve*, to rob; *rive*, to rasp, to tear]: to pass the end of a rope through any hole, as a block or pulley, through which it is to run. REEV'ING, imp. REEVED, pp. *rēvd*, or ROVE, pp. *rōv*.

REEVE, n. *rēv:* a bird, the female of the RUFF which see.

REEVE, n. *rēv* [AS. *gerefa*—from *rof*, active, excellent: comp. Icel. *greifi*, a governor: Dut. *graef*; Ger. *graf*, count]: steward or governor—now used only in composition, as *shire-reeve* or *sheriff*, *portreeve*, etc. Reeve was a magistrate in early times, in England and n. Europe, whose duties were at first principally fiscal. In the Saxon period in England, he represented the lord of a district, whether township or hundred, at the folkmote of the county; and within his district, he levied the lord's dues, and performed some of his judicial functions. The word survives in the shire-reeve or sheriff (*scyr-gerefa*), who was at first assessor to the ealdorman or earl, who, with the bishop, presided, but afterward became himself the presiding officer. Similar functions were exercised in boroughs by an elective officer called the Portreeve. In Anglo-Saxon times all the English boroughs were subject to the rule of a portreeve, for whom the Norman conquerors substituted a Bailiff (q.v.), who, in the larger towns, was allowed to assume the appellation Mayor.

REEVE, *rēv*, TAPPING, LL.D.: jurist: 1744, Oct.—1823, Dec. 13; b. Brookhaven, L. I., N. Y. He graduated at Princeton Coll. 1763, and was tutor there 1767–70. He began the practice of law at Litchfield, Conn., 1772, and there opened a law school, of which he was the sole instructor for 6 years; he then associated with himself James Gould (q.v.): the school was the first of the kind in the country, and earned a very high reputation. R. was a judge of the Conn. superior court 1798–1814, then for a few months chief-justice, when he retired at the age of 70 years. He wrote *Law of Baron and Femme, Parent and Child*, etc. (1816); and *Law of Descents* (1825).

REEVES, *rēvz*, SIMS: English tenor singer: b. Woolwich, 1821. Before his 14th year he was a performer on various instruments, and moderately versed in composition; and at that early age he was appointed organist and director of the choir in the church of North Cray in Kent. His musical education was conducted under J. B. Cramer, T. Cooke, and other artists of note. He appeared in public first as a baritone at Newcastle 1839, and was received with great favor. To perfect his voice and style, he went to Paris, and, after studying there for some time, appeared at Milan in the tenor part of Edgardo in *Lucia di Lammermoor*, when his singing electrified the audience. He returned to England 1847, and coming out at Drury Lane as Edgardo, was immediately recognized as the first living English tenor, a position which he maintained for many years. He was engaged 1848 at Her Majesty's Theatre; and 1851 was equally successful as first tenor at the Italian Opera in Paris. After ceasing to sing on the stage, he was popular as a giver of concerts.

RE-EXAMINE, v. *rē'-ĕgz-ăm'ĭn* [*re*, again, and *examine*]: to examine anew.

RE-EXCHANGE, v. *rē'-ĕks-chānj'* [*re*, again, and *exchange*]: to exchange anew: N. in *commerce*, the expense chargeable on a bill of exchange which has been dishonored in a foreign country.

RE-EXHIBIT, v. *rē'-ĕgz-hĭb'ĭt* [*re*, again, and *exhibit*]: to exhibit again.

RE-EXPEL, v. *rē'-ĕks-pĕl'* [*re*, again, and *expel*]: to expel again.

RE-EXPERIENCE, v. *rē'-ĕks-pē'rĭ-ĕns* [*re*, again, and *experience*]: to experience again, or a second time: N. a renewed or repeated experience.

RE-EXPORT, v. *rē'-ĕks-pōrt'* [*re*, again, and *export*]: to export what has been imported; to export again. RE-EX'PORT, n. any commodity re-exported.

RE-EXPULSION, n. *rē'-ĕks-pŭl'shŭn* [*re*, again, and *expulsion*]: renewed or repeated expulsion.

REFASHION, v. *rē-făsh'ŭn* [*re*, again, and *fashion*]: to fashion or form a second time.

REFASTEN, v. *rē-făs'n* [*re*, again, and *fasten*]: to fasten anew.

REFECTION, n. *rĕ-fĕk'shŭn* [F. *réfection*, a meal—from L. *refectiōnem*, refreshment—from *re*, again; *faciō*, I make]: a restoring; a repairing; refreshment after hunger or fatigue; a spare meal or repast. REFEC'TIVE, a. *-tĭv*, refreshing; restoring: N. that which refreshes. REFEC'TORY, n. *-tĕr-ĭ* [mid. L. *refectōrium*]: in a *monastery* or *convent*, a hall or apartment where refreshments are taken; an apartment for refreshments or meals.

REFEL, or REFELL, v. *rĕ-fĕl'* [L. *refel'lĕrĕ*, to show to be false, to confute—from *re*, back; *fallĕrĕ*, to deceive]: in *OE.*, to refute. REFEL'LING, imp. REFELLED', pp. *-fĕld'*.

REFER, v. *rĕ-fĕr'* [F. *référer*, to refer: L. *referrĕ*, to bear or give back—from *re*, back; *fero*, I bear or carry: It. *riferire*]: to direct or send to for information or judgment; to assign, as to a class or order; to point or have reference; to impute; to have recourse; to reduce or bring into relation; to appeal to, as a book; to allude. REFER'RING, imp. REFERRED', pp. *-fĕrd'*. REFER'RER, n. *-ĕr*, one who refers. REFER'RIBLE, a. *-ĭ-bl*, that may be referred. REFERABLE, a. *rĕf'ĕr-ă-bl*, capable of being considered in relation to something else; that may be assigned. REF'EREE', n. *-ē'*, one to whom anything is referred for hearing or decision. REF'ERENCE, n. *-ĕns* [L. *ref'ĕrens* or *refĕren'tem*, bearing or giving back]: a sending or direction to another for information; allusion to; submission of a matter in dispute to another for decision (see REFERENCE, in LAW): one text of Scripture bearing on another. REF'EREN'DARY, n. *-ĕn'dĕr-ĭ*, in the early kingdoms of Europe, an officer who delivered the royal answer to petitions, and procured, executed, and dispatched decrees, diplomas, charters, etc. The office of Great Referendary in the monarchy of France

merged eventually in that of Chancellor. REF'EREN'TIAL, a. *-ĕn'shăl*, that points or refers to something else. —SYN. of 'refer': to advert; allude; appeal; relate; point;—of 'referee': judge; umpire; arbitrator.

REF'ERENCE, in Law: the sending by a court, or by agreement of the parties, the decision of a matter to an arbitrator, or to an officer of the court, or master. In cases where parties, not having begun litigation, agree to arbitration, they usually execute a deed or agreement of submission; but after litigation has begun, if the judge think it better that an arbitrator should settle the dispute, an order of reference is drawn up for that purpose.

REFERENDUM, n. *rĕf-ĕ-rĕn'dum* [L., neut. of *referendus*, to be referred]: in *International law*, submission, by a diplomatic representative, to his government, of a proposition not covered by his instructions: as, to accept a proposition *ad referendum*. In legislation, the submission of a proposed public measure or law, which has been passed upon by the people's representatives in legislature or in convention, to a vote of the people for ratification or rejection. In Switzerland the R. is, under certain conditions, a constitutional right of the people in respect to acts of legislation. The laws both of the cantonal councils and of the federal assembly are subject to the R. In some of the cantons all laws of the cantonal council *must* be submitted to the people: this is the 'obligatory' R. In other cantons all laws must be submitted to the people whenever a certain number of electors formally demand such submission: this is the 'facultative' R. In cantons where the R. is obligatory, projects of laws, or bills, after discussion in the council, come up before the people for approval or for veto. The people write 'yes' or 'no' on a printed voting-paper and deposit it in a receptacle under official control. By the federal constitution of 1874 there is a facultative R with regard to all federal laws. All federal laws must be submitted to the people for their judgment whenever 8 cantons or whenever 30,000 electors demand it; and if a revision of the federal constitution itself is demanded by not less than 50,000 electors, or by one of the two houses of the federal assembly, the question of revision must be submitted to the people.

REFERMENT, v. *rē-fĕr-mĕnt'* [*re*, again, and *ferment*]: to ferment anew.

REFINE, v. *rē-fīn'* [*re*, again, and *fine*: F. *raffiner*; Sp. *refinar*, to refine]: to free from dross or extraneous matter; to purify; to clarify; to polish or improve, as in language, manners, taste, etc.; to improve in accuracy or excellence; to become pure. REFI'NING, imp.: N. the act or process of purifying or improving (see REFINING OF METALS). REFINED', pp. *-fīnd'*: ADJ. made pure; polished; elegant; polite. REFI'NER, n. *-nĕr*, one who refines, particularly metals. REFINE'MENT, n. *-fīn'mĕnt* [F. *raffinement*]: act of purifying; state of being pure or refined; high polish of manners, etc.; purity or elegance of language, manners, etc.; politeness; cul-

tivation to a high degree; artificial practice; affectation of elegant improvements; excess, as of cruelty. RE-FI'NEDLY, *adv.* -*d*-*l*-*h*. REFI'NEDNESS, *n.* -*nes*, state of being refined. REFI'NERY, *n.* -*n*-*r*-*i*, a place where anything is purified, particularly sugar or metals. —SYN. of 'refinement': purification; cultivation; civilization; polish; elegance; politeness; gentility.

REFINING OF METALS: usually the last operation connected with the smelting of copper, tin, lead, and some other metals. With copper, e.g., the impure or 'blister' copper, containing 95 to 98 per cent. of the metal, alloyed usually with small quantities of iron, tin, antimony, etc., is melted in a refining furnace, and exposed to the oxidizing influence of the air. By this means, the foreign metals present become oxidized, and rise to the surface as slag, which is skimmed off; the oxide of copper, formed during the process, being afterward reduced by throwing coal on the surface of the melted metal, and stirring with a pole of green wood. The disengagement of gases from the wood during the 'poling' causes the metal to splash about, and so expose every portion of it to the reducing action of the coal; thus the oxide of copper is deprived of its oxygen, and the copper rendered nearly pure.

Tin is refined also by throwing billets of green wood into it while molten, which has the effect of bringing impurities to the surface; zinc, in a somewhat similar way to the oxidizing of foreign metals in copper: see TIN.

Lead is purified from antimony and tin by an analogous mode of oxidation, and silver is separated from it by a special process: see LEAD.

The refining of iron is a name applied to the process for partially separating the carbon from cast-iron (see IRON). Of the less important metals used in the arts, zinc, antimony, and mercury do not usually undergo any special refining process; aluminium, it is said, will not afterward purify when once reduced to the metallic state; and nickel, of which German silver is largely composed, is refined by a process or processes kept strictly secret.

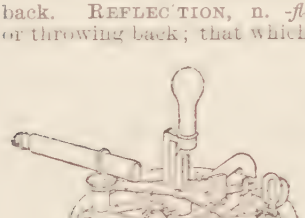
No metal is ever quite pure in its commercial state, even though it has gone through the usual operation of refining, but all are to some extent alloyed with certain others. For the great majority of purposes, it is not necessary that metals should be chemically pure, and when it is they can be made so only by delicate chemical processes. It is always necessary, however, that the refining of gold and silver should be carried further than that of the less valuable metals. To render gold sufficiently pure for manufacture into coin, an ingenious process is advocated, by which fused gold is mixed with about 10 per cent. of black oxide of copper, and then stirred to oxidize any foreign metals which happen to be present. The oxide of copper does not fuse, but is dispersed through the melted metal, and oxidizes any

tin, antimony, or arsenic, causing them to rise to the surface so that they may be skimmed off. Perfectly pure gold is prepared by dissolving the metal in aqua regia—mixture of nitric and hydrochloric acids—and precipitating silver (with which it is almost always alloyed) as well as any other foreign metals by chemicals which have no action on the solution of gold. The metallic gold is afterward precipitated as a finely divided powder, by a salt of iron, and is then fused and cast into bars. Silver is rendered pure by dissolving it in nitric acid, filtering the solution, and then precipitating the metal with common salt, as a chloride of silver: this is afterward mixed with sulphuric acid, and then, by introducing bars of zinc, a chloride of zinc is formed, while the silver is reduced to the metallic state.

REFIT, v. *rē-fit′* [*re*, again, and *fit*]: to prepare again; to restore after damage or decay. REFIT′TING, imp.: N. a fitting afresh. REFIT′TED, pp. REFIT′MENT, n. *-mĕnt*, a fitting out a second time.

REFIX, v. *rē-fiks′* [*re*, again, and *fix*]: to fix again: to establish anew.

REFLECT, v. *rĕ-flĕkt'* [L. *reflectĕrĕ*, to bend or turn backward—from *re*, back; *flecto*, I bend or turn round]: to throw back light, heat, etc.; to return rays or beams; to throw back; to revolve in the mind; to throw back the thoughts upon the past, or on themselves; to ponder; to meditate; to cast censure or reproach on or upon. REFLECT'ING, imp.: ADJ. throwing back light, heat, etc., as a mirror or other surface; given to attentive thought; meditative. REFLECT'ED, pp.: ADJ. thrown back; returned. REFLECT'EDLY, ad. *-lī*, in a manner bent or curved backward. REFLECT'INGLY, ad. *-lī*, with reflection; with censure. REFLECT'OR, n. *-ĕr*, a surface of polished metal, or any other suitable material, which throws rays of light, heat, or sound in any required direction. REFLECT'IBLE, a. *-ĭ-bl*, that may be thrown back. REFLECT'ENT, a. *-ĕnt*, bending or flying back. REFLEC'TION, n. *-flĕk'shŭn*, act of reflecting or throwing back; that which is reflected; rebound of



Troughton's Reflecting Circle.

Reflecting Telescope.

heat, light, or sound, or other body, from a surface against which it has struck (see below); image given back by a reflecting surface; action of the mind by which it views its own operations; expression of thought; thought on the past; attentive consideration; censure or reproach. REFLEC'TIVE, a. *-tĭv*, throwing back images; considering the operations of the mind or things of the past; pondering; musing. REFLEC'TIVELY, ad. *-lī*. REFLEC'TIVENESS, n. *-nĕs*, the state or quality of being reflective. REFLECTING CIRCLE, an astronomical instrument for measuring angular distances, being similar in principle to the sextant, but having its limb a complete circle. REFLECTING TELESCOPE, a telescope which has a mirror or speculum as its magnifier.—SYN. of 'reflect': to meditate; ponder; muse; ruminate; consider; think; cogitate; contemplate.

REFLEC'TION: rebound of light, heat, etc., from a surface: see CATOPTRICS: HEAT: UNDULATORY THEORY—under which titles the laws of reflection are stated, illustrated geometrically, and deduced from the theory prevalent in modern times of the nature of light and radiant heat. Here are to be mentioned one or two curious circumstances connected with reflection.

In general, a reflected ray is more or less *polarized* (see

POLARIZATION OF LIGHT); and if the reflecting surface be metallic, or if it be formed of a substance of high refractive index, e.g., diamond, it is in general *elliptically* polarized. In various cases, known principally by the laborious investigations of Brewster (q.v.), the *color* of the reflected light not only differs from that of the incident light, but is different for different angles of incidence, and for different azimuths of the plane of reflection. The theoretical explanation of these very singular facts has not been satisfactorily given. In fact, the problem of reflection from the surface of a metallic or a crystalline substance presents formidable difficulties, principally from lack of definite data for a satisfactory fundamental hypothesis; and, in a secondary manner, from the intricacy of the requisite mathematical investigations.

REFLEX, a. *rē'flĕks* [L. *reflexus*, bent or turned back—from *re*, back; *flexus*, bent, curved (see REFLECT]: thrown or bent backward: in *bot.*, very much curved backward: in *phys.*, applied to a class of actions in which certain muscles act upon indirect stimulation without the will of the individual: in *paint.*, illuminated by a light reflected from another body in the same picture: N. reflection. REFLEXIBLE, a. *rē-flĕks'i-bl*, capable of being reflected or thrown back. REFLEX'IBIL'ITY, n. *-bil'i-ti*, the quality of being reflexible; capability of being reflected. REFLEXED, a. *rē-flĕkst'*, bent backward. REFLEX'IVE, a. *-iv*, bending or turned backward; having respect to something past. REFLEX'IVELY, ad. *-li*. REFLEX'IVE VERB, n. *-iv vĕrb*, in *gram.*, a verb which has for its direct object a pronoun which stands for the agent or subject of the verb—as, he foreswore himself. Pronouns of this class are commonly called reflexive pronouns, and are usually compounded with *self*. REFLEX ACTION: see NERVOUS SYSTEM.

REFLUENT, a. *rĕf'lū-ĕnt* [L. *refluens* or *refluen'tem*, a flowing back—from *re*, back; *fluo*, I flow: It. *rifluire*; F. *refluer*, to flow again]: flowing or running back; ebbing.

REFLUX, n. *rē'flŭks* [F. *reflux*, ebb—from L. *re*, back; *fluxus*, flowing, fluid—from *fluĕrĕ*, to flow]: a flowing or running back.

REFORGE, v. *rē-fōrj'* [*re*, again, and *forge*]: to forge again or anew.

REFORM, v. *rē-fawrm'* [F. *réformer*—from L. *reformārĕ*, to shape again, to change—from *re*, again; *forma*, a shape: It. *riformare*]: to change from bad to good, or from worse to better; to change or return to a former good state; to be amended or corrected; to amend; to correct; to reclaim: ADJ. advocating or supporting reform: N. a change from worse to better; amendment. REFORM'ING, imp. REFORMED', pp. *-fawrmd'*: ADJ. restored to a good state; Protestant; applied loosely to all those Christian bodies which have separated from the Church of Rome since the Reformation (see RE-

FORMED CHURCHES: name often assumed by persons who have separated themselves from a parent religious society or assoc.—e.g., 'Reformed Presb. Church.' RE-FORM'EDLY, ad. *-ĕd-li.* REFORM'ER, n. *-ėr,* one who reforms; applied to one of those who engaged actively in the separation from the Church of Rome in the 16th c.: one who professedly applies himself to promote correction of abuses in the state or in society. REFORM'-ABLE, a. *-ū-bl,* that may be reformed. REFORMATION, n. *rĕf ėr-mā' shŭn* [F.—L.]: act of changing for the better, as in life or manners: amendment. REFORMATIVE, a. *rē-fawrm' ā-tiv,* forming again: having the quality of renewing form. REFORM'ATORY, n. *-tėr-i,* a house in which young offenders are placed and treated, with a view to improve their morals: ADJ. tending to improve manner of life and character. REFORM BILL, in *Eng. hist.*, commonly applied to the bill for reforming the representation of the people in the British house of commons, which became law 1832, June 7. PARLIAMENTARY REFORM, term generally denoting three series of legislative measures; chiefly the great Reform Bill of 1832; also the Acts of 1867, 8; and the Franchise Act 1884 and Redistribution of Seats Act 1885: see REFORM, PARLIAMENTARY: PARLIAMENT.—SYN. of 'reform, v.': to amend; mend; repair; improve; restore; reclaim; correct; emend; rectify; better; renew.

RE-FORM, v. *rē-fawrm'* [*re,* again, and *form*]: to put into order or arrange anew, as a procession; to rearrange and put into military order a body of troops scattered or in confusion.

REFORM', PARLIAMENTARY: name generally given to the acts which passed the legislature of the United Kingdom 1832, by which extensive change was made in the system of parliamentary representation. So far back as 1782, a motion by Pitt for reform of the franchise was lost by a majority of 20; and similar motions 1783 and 85 by majorities of 44 and 74. The horror inspired by the excesses of the French Revolution caused a reaction, repressing liberal tendencies. The popular revolutions of 1830 in France and Belgium, with mercantile distress in Britain, turned the popular mind toward an adjustment of the inequalities of the representative system, with an extended franchise, as a panacea for all ills. The demand for reform became imperious on the death of George IV. and accession of William IV. Meetings were held over all the country, and, though there was no open rioting, there was constant alarm. On the resignation of the Duke of Wellington, 1830, Nov. 16, the celebrated Reform ministry of Earl Grey came into office. Parliament assembled 1831, Feb. 3; and, Mar. 1, Lord John Russell proposed his first scheme of Reform, which passed only the second reading, and by a majority of 1. In the new parliament, June 14, a large majority, including all the county members for England except four or five, were pledged to support the bill, which was again introduced June 24,

and passed the third reading in the house of commons by a majority of 113. The upper house, however, threw it out on the second reading by a majority of 41, and parliament was immediately prorogued. It reassembled Dec. 6; and Dec. 12 the third Reform Bill was introduced in the commons by Lord John Russell, which did not, like the former bills, diminish the number of members—a concession which gave it a majority of 116 on the third reading. In the lords, the second reading was carried by a majority of 9, and the bill ordered to be committed. In committee, Lord Lyndhurst carried, by a majority of 35, a motion that the disfranchising clause should be postponed, and the enfranchising first considered; on which, the king having refused to accede to a creation of peers sufficient to carry the bill, the ministry resigned. A week of intense public agitation followed. The govt. were induced to resume office on the king granting them full powers to secure majorities by creation of peers; but eventually that expedient was avoided by a sufficient number of lords absenting themselves to leave ministers a majority on the third reading, when the bill passed by a majority of 84, receiving the royal assent by commission 1832, June 7. Reform bills for Scotland and Ireland were immediately afterward introduced and carried. For alterations made by these several measures in the distribution of members and the electoral qualification, see PARLIAMENT. The changes effected were so sweeping as to cause many advocates of Reform to be apprehensive that the balance of the constitution would be disturbed by preponderance of the democratic element; but the determination of the masses was such, that the conservative influences of the country were powerless to stay or modify the measure. Yet no sooner was the contest at an end, than a reaction followed, falsifying equally the hopes of the supporters of the bill, and the fears of its opponents (see REACTION, in Political History).

In 1854 a new Reform Bill was introduced by Lord John Russell for further extension of the suffrage; but it was withdrawn in consequence of the breaking out of the Crimean war. A Reform Bill brought in by Disraeli 1859 was rejected in the commons, and the consequence was a dissolution and change of ministry. The succeeding ministry of Lord Palmerston introduced and afterward withdrew a Reform Bill. For the main results of the Reform Bills of 1867,8, carried by the conservative ministry of Disraeli, as also for the Franchise Bills of 1884,5, see PARLIAMENT.

REFORMATION. The great spiritual and ecclesiastical movement in Europe in the 16th c. (beginning about 1517), whose result was the separation from the Church of Rome of the national churches of Britain, Denmark, Sweden, Norway, and Holland, and of many parts of Germany and Switzerland. In other countries, e.g., Hungary and France, the same movement detached large portions of the population from the Rom. Cath. faith, yet without leading to a national disruption with the papacy.

The causes of this movement were manifold; and, as may be supposed, they present themselves in very different lights to members of the two different communions.

To Protestants the R. appears as the natural result of causes long at work, which needed only a fitting occasion to bring them into active operation. The Church of Rome had gradually, from the 6th c., or the time of Gregory the Great, extended not merely its influence, but its direct control and government, over all the countries of w. Europe—in many places, e.g., Ireland, Scotland, and part of England, displacing the old national churches, planted in earlier times, which had survived under comparatively simple forms of government. Although some uncertainty exists as to the exact constitution, doctrine, and discipline of the old Scoto-Irish Church, there can be no doubt that it did not acknowledge the direct superintendence of Rome; and that it was only after a long and varying struggle, not terminating till the 12th c., that the popes fully established their authority, and set up over this ancient church a completed hierarchy connected with Rome. Only by keeping this in view can some features of the R. be clearly understood and appreciated.

The natural result of the almost universal supremacy of the Roman Church was, that the spiritual aspect of the church became gradually more and more merged in its mere machinery of external government. Everything that could give power and efficiency to it as an institute was carefully watched and nursed; but when, in the course of the 15th c., and even earlier, spiritual life began to die out in the centre of this vast system of ecclesiastical government, in Rome itself, the baleful effects of such spiritual decay speedily began to be felt through all its borders. The growing corruption showed itself in many forms—in a prevailing ignorance among the monks and higher clergy; in the perversion of ecclesiastical offices, and especially in the grossly materialistic abuse of spiritual privileges and censures. The ignorance of the monks is depicted in strong colors in the satires of Erasmus and Buchanan, and in such books as *Epistolæ Obscurorum Virorum*. The great impetus which the friars had given to the papal power in the 13th c. had ceased. They had sunk, from being zealous and active preachers, into bigots and mendicants, cumbering the ground. The secular clergy were hardly less

corrupted; in many cases, the higher dignitaries of the church had no interest in the spiritual duties of their office, and gave themselves up entirely to the pleasures of a worldly life, or at best to the duties of political or military activity. The revival of the old classical literature in Italy—the spirit of what is called the *Renaissance*—accelerated this spiritual decay. The papacy itself became half-pagan. The church was little cared for even as an organ of government; it was used as an engine of self-aggrandizement and the most extravagant luxury: see RENAISSANCE, THE.

These general causes, however, might have proved inefficient to produce any such radical change as the R.; they had been long felt and deplored. Wycliffe in England, and Huss and Jerome of Prague, had denounced in the most vigorous manner the prevalent abuses; they had excited a widespread popular interest, and even to some extent secured royal favor. But the overbearing power of the church proved too strong for the reforming spirit in its earlier manifestations. In the midst of his evangelical activity, Huss was betrayed, through the promise of a safe-conduct, into making his appearance at the Council of Constance 1414. No sooner was he fairly in the power of the council, than he was confronted with certain articles of abjuration; and refusing to submit without being convinced, he was, in defiance of the promise made to him, condemned to be burned as a heretic. The rising spirit of reformation was temporarily quenched in the flames which consumed the intrepid martyr of Bohemia. The council did nothing effectual to repair the abuses which he had denounced. The church remained apparently strong after temporary excitement and alarm.

In the mean time, however, throughout the 15th c., new seeds of preparation for the great work were everywhere sown and springing up. The literary movement begun in Italy was spreading in Germany, in England, and elsewhere. Reuchlin arose in Germany, Erasmus in Holland; England welcomed the latter as a student early in the reign of Henry VIII., while he was engaged in preparing his edition of the Greek New Testament. Various manifestations of spiritual life showed themselves, especially in the Rhine country. The Brethren of the Common Lot took up in a more evangelical form the succession of the Brethren of the Free Spirit, whose teaching had degenerated into a species of spiritualistic pantheism. Gerhard Groot and Thomas à Kempis represent this comparatively evangelical tendency; and springing from them, various men—notably John Wessel of Gröningen—have been called 'Reformers before the Reformation.' If we add to these influences the internal political agitations of the Germanic empire—whose traditional opposition to the papacy was not forgotten—the growth of a healthy political activity in many of the great municipalities of the empire, we shall find abundant incitements to the R. in the social state of Europe,

especially of Germany, and in the church, in the beginning of the 16th c. It required only a definite spark to kindle the smouldering agitation, and this was not long lacking.

Whatever may be said of the doctrine of Indulgences as theoretically stated, it is not denied by the most zealous defenders of the institution that it has at all times been liable to the gravest abuse; and it so happened that at the period in question the abuse had risen to a scandalous height: see INDULGENCE. An agent of this system, Tetzel, a Dominican friar, came into Saxony 1517, and established himself not far from Wittenberg, for the purpose of dispensing papal indulgences. He was a man of low and unscrupulous character, gifted with great volubility, and he carried on his traffic in a peculiarly offensive and shameless manner. Luther, who had been recently created a doctor in the Holy Scriptures, and entered on his career as a teacher in the Univ. of Wittenberg, was roused to indignation by what he heard of the doings of this man. He saw the evil influence of the system on the members of his own flock, and determined to raise his voice against it. 'God willing, I will beat a hole in his drum,' he exclaimed, with reference to the coarse vehemence with which Tetzel commended the value of his wares. He posted on the door of the church of Wittenberg his famous 95 theses, and thereby created such popular excitement that Tetzel was silenced, and compelled to retreat from the field. This was the beginning of the R. in Germany. Luther's attention, once aroused to the working of the papal system, was then turned to its examination in different aspects, with the result that his resolution to assail it strengthened. Neither cajoling nor threats, neither the bland softness of Cajetan nor the blundering polemics of Eck, were of avail to silence him. A papal bull was at length fulminated against him; and he consummated his audacity by burning the bull at one of the gates of Wittenberg 1520, on the memorable Dec. 18.

About the same time, and without any concert, a similar movement against the sale of indulgences began in Switzerland. In 1520 the Franciscan friars, who had the charge of promulgating the indulgences there, were opposed by Zwingli, preacher in Zürich. His opinions were declared heretical by the two great universities of Cologne and Louvain; but he declared himself unmoved by the voice of Rom. Cath. authority; the magistrates and people of the city supported him; and the result was the active spread of the reforming spirit, not only throughout Zürich, but the neighboring cantons of Schaffhausen, Basel, and Bern.

In the mean time, Luther advanced in his work. He addressed the 'Christian nobles' of Germany, loudly declaring that the time to rise against Rome was come. 'Talk of war against the Turk,' he cried; 'the Roman Turk is the fattest Turk in the world; Roman avarice

the greatest thief that ever walked the earth; all goes into the Roman sack, which has no bottom, and all in the name of God, too!' Step by step he opened his eyes to the errors of the papacy, and no sooner reached a new conviction himself, than he launched it forth into the world. He pronounced against the Seven Sacraments, in favor of only three—Baptism, the Lord's Supper, and Penance. He contended for the use of the cup to the laity. His rapid writings—no fewer than three in the same year, which he closed by burning the papal bull (1520)—circulated in thousands, and were eagerly read. Nearly all Germany was aflame with the new spirit, and it seemed as if the empire would be wholly lost to the papacy.

The interposition of Charles V. produced at this crisis a temporary interruption in the progress of the Reformation. Charles was crowned emperor of Germany 1521, Jan., and immediately summoned at Worms a diet of the sovereigns and states of the empire. The papal leaders exerted themselves to have Luther summarily condemned at the diet. They succeeded so far as to make the emperor issue an edict for the destruction of the reformer's writings; but the estates refused to publish it unless Luther was allowed opportunity of meeting his adversaries, under safe-conduct, and answering before the diet to the charges preferred against him. Luther was accordingly summoned to meet the assembled authorities of Germany at Worms. He gladly and proudly embraced the summons. His journey thitherward was a kind of triumphal procession, so enthusiastically did the people, and even some of the priests, greet him along the route. He is said to have entered Worms chanting 'Ein' feste Burg ist unser Gott'—the *Marseillaise* of the R., as it has been called. The same night, however, the intrepid monk was overheard in an agony of prayer in his room, overwhelmed by the solemnity of his circumstances. On the afternoon of the following day he made his appearance before the diet, and confronted its assembled statesmen and princes—a scene grand and striking in its features, which has been often painted. He was urged to retract; but he was immovable. In a speech, first in German, then in Latin, he expressed his determination to abide by what he had written, and called on the emperor and the states to take into consideration the evil condition of the church, lest God should visit the empire and German nation with His judgments. A direct answer was demanded from him whether he would retract or not. 'I neither can nor dare retract anything,' he replied, 'unless convinced by reason and Scripture; my conscience is a captive to God's Word, and it is neither safe nor right to go against conscience. There I take my stand. I can do no otherwise. So help me, God. Amen.'

It was evident that Luther was not to be intimidated. He remained some days in Worms; but neither persuasion nor threatening availed with him. He received

orders to depart; and in the end of April, he set out on his way home. As he left Eisenach a few days afterward, and was passing through a narrow defile near the fortress of Altenstein, he was seized by two armed horsemen with attendants, carried to the neighboring castle of the Wartburg, and there lodged in safety. This apparently violent seizure was the friendly act of his sovereign, Frederick of Saxony, to protect him from the destruction that his intrepid conduct was certain to have called down upon him had he remained at liberty. The ban of the empire had followed him, and temporary obscurity was his only safety.

The R. suffered, however, from the absence of his guiding hand. Carlstadt and others, left alone at Wittenberg, gave the rein to many excesses. Reform seemed likely to merge into license. The heart of Luther, after a year's residence in obscurity, was incontrollably stirred within him to be at his old post again, directing and controlling the spirit of innovation; and he returned to Wittenberg 1522, Mar. The lawless movement, however, which had received impulse, was not to be restrained. It broke out in many quarters. Social oppression and misery added to the flames of fanaticism. The peasantry rose in arms, headed by the Anabaptist Münzer, and the horrors of a civil war raged throughout Germany. Luther exerted all his influence to stem the unhappy tide of affairs; exhorted the nobles on one hand, and the peasants on the other; and at no part of his career did he show a higher spirit and wisdom, though he has not always got the credit of this.

With his hands thus full of practical labor, he plunged at the same time into a violent controversy with Erasmus, which reflected little credit on him. Erasmus and he had hitherto, though in different ways, co-operated in the same cause; but they were men of such different spirit and temper, that a separation was inevitable. Luther had felt this for some time, but he was reluctant to come to an open breach. 'Do not join your forces to our adversaries; publish no books against me, and I will publish none against you,' he had said in a letter 1524. On the publication, however, of Erasmus's treatise *De Libero Arbitrio*, Luther could no longer hold silence. He responded in the same year, 1525, by his counter-treatise, *De Servo Arbitrio;* and the war of words was waged hotly and vehemently between them. Luther was not only hearty but violent in denunciation; his indignation sank into coarseness, while the audacity of his logic plunged him into unguarded and even immoral paradoxes, which left him gravely open to the cold and telling sarcasms of his opponent. He was evidently himself little satisfied with the result, and even his warmest admirers cannot see much to admire in the spirit and zeal which he manifested on this occasion.

Hitherto, the R. had not received any legal establishment. Frederick of Saxony, while warmly protecting Luther and his followers, did not yet take any steps to

displace Romanism by legal enactment, setting up in its stead a Reformed church. This was now done, however, by Frederick's successor. He commissioned Luther and Melanchthon to prepare a new form of church government and church service for his dominions. His example was followed by the other princes and states in Germany that had renounced the papal supremacy. The R. thus obtained substantive existence and civil support. It was no longer merely a spiritual movement; it became thenceforth also a political power. This important result showed itself conspicuously at the Diet of Spires 1526. An endeavor at this diet to suppress the new religious movement, and to insist on rigorous execution of the papal sentence against Luther and his followers, was successfully opposed by a majority of the princes and representatives of states; and it was resolved on the contrary that the princes should have full power to order ecclesiastical affairs in their own dominions as they thought proper. This resolution served greatly to extend the Reformation. The emperor was too busy for some years with his own affairs to be able to interfere with the course of events; and the reforming cause was in the mean time greatly strengthened and advanced in various states of Germany.

This period of progress and tranquillity was soon interrupted. A new diet was convoked at the same place 1529; and under the more powerful influence of the papal party, backed by the presence of the emperor's brother, who presided in the diet, the measures of the former diet were recalled, and all changes in religion declared to be unlawful except such as might be authorized by an approaching general council. It was then that the Elector of Saxony, the Landgrave of Hesse, and other princes of the empire who had already embraced the R., and established it in their dominions, made a solemn *protest* against the action of this diet—a circumstance which gave rise to the name *Protestants*, which has since attached to all the followers of the R.: see PROTESTANT.

While the R. thus ran its course in Germany, and was adopted by the civil authorities in many states, it was making corresponding progress in Switzerland; and there at length also, after a famous and elaborate conference at Bern 1528, under the countenance of the civil authorities, the supremacy of the pope was abolished, and the Reformed doctrines, in even a broader and more definite shape than in Germany, were declared the only doctrine of Scripture. Bern, Zürich, and Basel continued to be the main centres of the Reformed movement in Switzerland; but the Reformed doctrines gradually extended throughout the great majority of the cantons. Chiefly those surrounding the Lake of Lucerne remained, as they remain to this day, strongly attached to the Rom. Cath. faith. The chief point of difference between the reformers in Switzerland and Germany concerned the doctrine of the Eucharist. Luther, while abandon-

ing the doctrine of a literal conversion of the bread of the Eucharist into the body of Christ, known under the name transubstantiation, held to a modification of this doctrine, erroneously called consubstantiation. The bread did not *become* the body of Christ literally, but it *contained* the body of Christ: Christ was in the bread as really 'as the sword in the scabbard, or the Holy Ghost in the dove.' Zwingli, on the contrary, and his co-reformers in Switzerland, discarded all outward presence of Christ in the Eucharist: the service in their view was merely memorial. 'It is the spirit that quickeneth; the flesh profiteth nothing'—a passage which they applied to prove the worthlessness of any supposed eating of the body of Christ, even if such a thing were possible.

The dispute which arose on this subject between the reformers of Germany and Switzerland, and especially between their respective leaders, Luther and Zwingli, proved a serious impediment to the cause. Philip of Hesse sought to bring about reconciliation between them. Zwingli, Bucer, and Œcolampadius met with Luther and Melanchthon at Marburg 1529, on Philip's invitation, and held a long conference, but without result. Luther was not to be moved in a matter which he held to be of the very essence of the Christian faith. The combatants separated with their opinions unchanged.

When Charles V. perceived the firmness of the Prot. princes in the position which they had taken, he became anxious for temperate and conciliatory measures. In an interview with the pope at Bologna, he urged, but without success, the necessity of a general council, and at the same time took means to convene personally with the princes at a new diet to be held at Augsburg. In view of this important convention, the reformers prepared, at the instance of the Elector of Saxony, a statement of their special doctrines. The basis of this, the famous *Confession of Augsburg*, were 17 articles, delivered by Luther to the elector at Torgau, which had been adopted at a conference at Schwabach 1529. These articles, enlarged and polished by the careful and moderate pen of Melanchthon, were submitted in 28 chapters to the diet which met at Augsburg 1530, June. 21 chapters were occupied with the statement of the opinions of the reformers, and the remaining 7 with an exposure of the errors of popery. The reading of this confession by the Chancellor of Saxony, in name of the Prot. states, made an earnest and favorable impression on the diet. The papal authorities submitted a reply, which was approved by the emperor, and ordered by him to be accepted as a conclusion of the religious differences which had arisen. The Protestants responded instead by an answer to the papal document, afterward expanded by Melanchthon, and published under the title *Apology for the Confession of Augsburg*.

The religious schism between the emperor and many of the states of Germany seemed now approaching a

crisis which could terminate only in war. A renewed decree exceeding in severity that of Worms was launched against the reformers. They on their part appreciated the solemnity of the crisis, and met, headed by the Elector of Saxony, first at Schmalkald, then at Frankfurt, 1530, 1, when they entered into a treaty of defensive alliance, and encouraged each other in the resolution to maintain their religion and liberties against the threatened encroachments of the imperial edict. To Henry VIII. of England, then just beginning his own erratic career of reformation, they sent a special invitation to co-operate with them, on the basis of the doctrines of the *Confession of Augsburg*—an invitation to which he responded, but which issued in no practical result. The emperor, notwithstanding the strongly hostile attitude which he had assumed, was not prepared as yet to plunge into hostilities. The Turks were menacing the frontier of the empire; he had his own personal objects to gain in the advancement of his brother Ferdinand to the dignity of king of the Romans, an object which he could not accomplish without a majority of votes at an imperial diet. He was content, therefore, to enter anew into negotiations with the Prot. princes; and after many unavailing projects of reconciliation, a treaty of peace was concluded between them at Nürnberg 1532. The Protestants agreed to support him against the Turks, and to acknowledge Ferdinand as king of the Romans; while the emperor in his turn agreed to abrogate the edicts of Worms and Augsburg, and allow the Protestants free exercise of their religion until some settlement by a general council or a diet of the empire.

It was the emperor's necessities and not his will which consented to the peace of Nürnberg; there was no prospect therefore of its being lasting. But the Protestants availed themselves of their temporary repose to strengthen themselves and extend their power. The emperor continued to urge the pope to convoke a general council. At length, 1536, Paul III. issued a summons for a council to meet at Mantua in the following year; but the Duke of Mantua being disinclined to receive so many turbulent guests into his quiet city, the project did not take effect. In anticipation, however, and convinced that no council convened under the exclusive influence of the pope would deal fairly with the subject in dispute, the Protestants met at Schmalkald 1537, and, while solemnly protesting against a mere Italian or papal council, at the same time agreed to a new summary of their doctrines, drawn up by Luther, to be presented to the assembled bishops. This summary is known under the name of the *Schmalkald Articles*, and with the *Confession of Augsburg* and the *Apology for the Confession* constitutes to this day the doctrinal basis of the German Lutheran Church.

At length, 1546, the same year in which Luther, worn out by his many toils, died somewhat suddenly at Eisleben, a council assembled at Trent. It was soon evi-

dent that no compromise was practicable between the Prot. and the papal parties; and both sides prepared to try the venture of war. When the Council of Trent promulgated its decrees, and the Reformed princes in the Diet of Ratisbon protested against their authority, the emperor raised an army to compel their obedience. They on their part were ready with their forces, and marched into Bavaria against the emperor. The results, in the first instance, were severely disastrous to the Prot. cause, chiefly through the division of the princes, and especially the perfidy of Maurice, nephew of the Elector of Saxony. Various attempts at reconciliation and compromise were again attempted, in which Melancthon was prominent; but, as before, they came to nothing. A change of fortune gave temporary triumph to the Prot. arms, and the result was that Charles concluded a formal treaty at Passau 1552, which may be considered the foundation of the Prot. liberties of Germany. The Protestants stipulated for free exercise of their religion, until the meeting of a diet which should settle a permanent religious peace, and in return, they agreed to lend assistance against the Turks, who were still menacing the frontier of the empire. The promised diet assembled at Augsburg 1555, and framed articles for the religious pacification of Germany, according to which all adherents of the Augsburg Confession of Faith were left in undisturbed enjoyment of the rights which they had acquired, were freed from papal domination, and allowed to order their religious concerns as seemed best to them; Protestants and Roman Catholics alike being bound to respect each other's convictions, and not to injure or persecute one another on account of religion, under penalty of being proscribed against as enemies of the empire. This treaty of Augsburg terminates the period of the R. in Germany.

In the neighboring countries of Denmark and Sweden, the progress of Reformed opinions had proceeded still more rapidly than in Germany. In both these countries, the sovereigns took the lead in enlightening their people, and freeing them from the tyranny of the Church of Rome. In Sweden particularly, Gustavus Vasa showed great courage and prudence in carrying out a reforming policy. He invited learned Lutheran teachers into his dominions, and showed special zeal in the circulation of a Swedish version of the Scriptures, made by one of these teachers, named Olaus Petri, the most eminent among the Swedish reformers. At an assembly of the states at Westeras 1527, while the reformers in Germany were still struggling for bare existence, it was unanimously resolved that the Lutheran doctrines should be adopted in Sweden, and a Reformed church, entirely independent of Rome, established. The same result occurred in Denmark 1539, when an assembly of the Danish states at Odensee gave formal sanction to a plan of religious doctrine, worship, and discipline, drawn up by Bugenhagen, disciple and friend of Luther, whom Chris-

tian III. had invited from Wittenberg for the purpose.

In France, the progress of the R. was much more uncertain and wavering. As early as 1523, the new doctrines had spread greatly in many parts of France, under the countenance of Margaret, Queen of Navarre, sister of Francis I., the constant rival of Charles V. The names chiefly associated with this early phase of the French R., besides that of Margaret herself, are those of Lefèvre and Farel, the latter particularly a man of active and fiery zeal, originally a priest in Dauphiné, whom we find subsequently associated with Calvin in Geneva. The Univ. of Paris became for a time strongly infected with the 'new learning,' and many of the nobility, as well as the people, were actually inclined to throw aside the traditions imposed by Rome. But the violent and inconsistent policy of Francis I., and the fierce spirit of faction which the struggle engendered, gave an unhappy turn to the course of events in France, and prevented the R. from obtaining in that country any such national recognition as it obtained in Germany and elsewhere. Both Farel and Calvin were driven by the violence of persecution into Switzerland. Calvin settled for a time at Basel, where he completed and published the first ed. of his *Institutes*. The famous preface, addressed to Francis I., bears date Basel 1535, Aug. 1. In 1536 he repaired to Geneva, where Farel, already laboring in the work of the R., retained him by a 'divine menace,' and he began his illustrious career as reformer, theologian, and legislator.

In Spain and in Italy, the spread of the R., which in both countries had taken an active and hopeful start, was almost entirely suppressed by the power of the Inquisition. The Church of Rome was able to bring its whole force to bear upon these countries, unchecked by political hostility. The flames of martyrdom, which elsewhere seemed to kindle a double zeal for the cause which they aimed to destroy, were here kept burning with such incessant and devouring cruelty as to consume all life out of the new movement, and brand the name Protestant with the infamy which, in the popular mind, always attaches itself to hopeless failure.

The same policy was attempted in the Netherlands. More than 100,000 of the inhabitants are said to have fallen under the atrocious cruelty of Charles V. and his son, Philip II. But the spirit of political freedom and moral earnestness proved at length adequate, and finally, through a protracted and bloody conflict, more than adequate, to cope with the blood-thirstiness even of Philip and Alva; and the principles of the R., after a Calvinistic type, were at length established in the United Provinces, together with the political supremacy of the House of Orange.

The R. in England presented peculiar features—an undercurrent of popular movement, dating even from the time of Wycliffe, and a somewhat inconsistent and wavering series of political changes during the

reigns of the three Tudor princes, Henry VIII., Edward VI., and Elizabeth. In the beginning of the 16th c., as early as the first movements of Luther, there were indications of a revival of evangelical religious life among the tradesmen of London and the peasantry in various parts of the country, particularly in Lincolnshire. The popular mind had begun to regard with suspicion and ridicule some of the most characteristic doctrines of Romanism. The residence of Erasmus in England, in the beginning of the reign of Henry VIII., stimulated a spirit of biblical inquiry among the educated classes, which, while it remained mostly faithful to the Church of Rome, as in the case of More and others, yet helped to advance a reforming movement. The study of his Greek Testament was eagerly entered upon by a few students at both universities, especially Cambridge. We find Bilney, Tyndale, and Frith associated at Cambridge 1520; and in the decade following, Cranmer, Ridley, and Latimer became prominent. It is at the end of this latter period — 1529 — a year before the meeting of the Diet of Augsburg in Germany, that the R. in England took its first decided advance. In this year, the usurpations of the clergy, and the manifold ecclesiastical abuses prevailing in the country, were the subject of parliamentary legislation. The negotiations as to Henry's divorce from Catharine had been proceeding for some time, and the country was greatly excited by the course of events. In 1533 Henry was married to Anne Boleyn, and his former marriage with Catharine declared void. All appeals to Rome were forbidden. In the two following years, the sovereign was declared the supreme head of the Church of England, with authority to redress all errors, heresies, and abuses in the church, the monasteries were dissolved; and parliament petitioned that a new translation of the Scriptures might be authorized, and set up in churches. In all this course of reformation, however, there was but little religious impulse on Henry's part, for we find him, 1539, entering violently on the path of reaction, and passing the famous statute known as the Six Articles, which rendered it penal to deny the doctrine of transubstantiation, or to affirm that priests might marry. Cranmer, who had been for some years Abp. of Canterbury, labored to prevent their passing; and Latimer resigned his bishopric as soon as they were confirmed.

With the accession of Edward VI., 1547, the R. greatly advanced. The statute of the Six Articles was repealed, with other reactionary measures of the close of Henry's reign. The parliament of 1548 established the use of the Book of Common Prayer; the clergy were permitted to marry; the cup was allowed to the laity; and 1551 the 42 articles of religious belief, afterward reduced to 39, were promulgated. The temporary restoration of popery under Mary, and the final establishment of Anglican Protestantism under Elizabeth, belong to the special history of these reigns.

In Scotland the reforming impulses began with Patrick Hamilton about the same time that Cranmer and Latimer first appear active in England. Hamilton was educated in Paris and in Germany, and learned there the doctrines which he introduced into his native country. There was something, indeed, of the same popular movement, known under the name Lollardism in Scotland, as in England, and Hamilton's preaching may have served to kindle the dying embers of this movement. His judicial and ecclesiastical murder 1528 produced immense effect in preparing the way for the R. in Scotland. 'Men began,' says Knox, 'very liberally to speak.' 'The reik of Mr. Patrick Hamilton infected as many as it did blow upon' (see HAMILTON, PATRICK). After Hamilton, George Wishart appears as the next hero-martyr of the Scottish R.; and in connection first with him- as his reverend disciple and companion—we hear of John Knox, who became finally the great leading spirit of the movement, by whose influence popery was extirpated, and the R. established in Scotland 1560. The Scottish R. followed the type of the Calvinistic R. in Geneva, where Knox had taken refuge during the period of persecution in Scotland, and had been for some years the companion of Calvin. Episcopacy was abolished, and the fabric of the Reformed Kirk set up in every respect as far as possible in opposition to the papal system. See the works of Ranke, Hagenbach, Gieseler, Marheineke, Hottinger; of Merle d'Aubigné; and the works named under the titles ENGLAND, CHURCH OF: SCOTLAND, CHURCH OF.

Such is the light in which this great religious revolution presents itself to the Protestant. Rom. Cath. students naturally regard it very differently; and though the name REFORMATION has come to be generally adopted as the historical designation of the religious movement of the 16th c., this name is accepted by Rom. Catholics under protest only, and as a conventional phrase, whose rigorous meaning they distinctly repudiate. The more strict writers among them employ in its stead the name 'Pseudo-Reformation,' or 'So-called Reformation.'

As regards the event itself, Rom. Catholics, while they admit that many abuses existed in the church which called for reform, and many superstitions which deformed the true character of religion among the ignorant masses of the people, contend nevertheless not only that the extent and the nature of these abuses and superstitions are greatly exaggerated, but also that the task of reforming them did not imply either the necessity or the lawfulness of a separation from the church. They assert that the conduct and character of many of those most prominent in the movement prove them to have been influenced by corrupt and unworthy motives; that in their effort to throw off the obedience of Rome, they rather sought emancipation from moral and disciplinary restraint, than the purification of the religious system of

the church; that the change in many of the countries in which it was effected was wrought mainly through the agency of the sovereign, with a view to appropriation of the revenues of the church; and that in others it was wrought by appealing to the prejudices of excited and unreasoning multitudes, who were taught to confound the system with its abuses, and who were incapable of distinguishing the true doctrine of the church from the superstitions justly held up for reprobation. Thus, in the view of Rom. Catholics, the true REFORMATION of the church was not that which has been described above as carried out by the seceders of the 16th c., but that internal change effected by the decrees of the Council of Trent, and by the religious revival simultaneous with the sittings of that assembly. They dwell much on the fact that all the notable successes of Protestantism were in the period of its origin, and that in the words of Lord Macaulay, if Protestantism had at its first onset 'driven Catholicism to the Alps and Pyrenees,' so Rom. Catholicism, in its turn, 'rallied and drove back Protestantism even to the German Ocean.'

As to the moral and religious results of the R., the same difference of opinion exists. That the very necessity of action which it created had a beneficial influence on their own church, by the internal revival to which it led, Rom. Catholics freely admit; but they regard the revolt against authority, the inauguration of religious innovation and skepticism, the separation from the church and the disruption of Christian unity, as heavily fraught with moral and intellectual evil; and a work of much learning has been devoted by the well-known theologian, Dr. Döllinger (q.v.), to establishing this point, by the confessions of the first reformers themselves, and their immediate successors. See *Die Reformation, ihre innere Entwickelung und ihre Wirkungen*, von J. Döllinger (3 vols. 8vo, Regensburg 1848).

REFORMED CHURCH IN AMERICA (DUTCH): descendant of the same church in Holland, there first known as 'the Churches under the Cross,' and completely constituted 1563 at Antwerp by the establishment of a synod, and the adoption of the confession and catechism maintained to this day. The Dutch W. India Co. always sent with emigrants a pious schoolmaster, called Ziekentrooster, or Comforter of the Sick, whose piety, or at least seriousness of life, was well guarded by a multiplicity of duties besides teaching and comforting, such as doing service as sexton, bearing the state cushion before the director or gov., presiding at religious meetings, leading the singing, and reading sermons (in the absence of a regular ministry), catechizing, and giving out funeral invitations. When Director Minuit arrived at the trading-post on Manhattan Island 1620, two Ziekentroosters were chosen, Sebastian Jansen Krol and Jan Huyck. Not until 1628, Aug. 11, did the first minister arrive, the Rev. Jonas Michaelius; he first established the form of a church; two elders were chosen, and, at the first administration of the Lord's Supper, there were full 50 communicants, Dutch and Walloons (Flemish), besides some French, to whom the pastor administered the rite in their own language and mode. Dominie Everardus Bogardus came in 1633. In a horse-mill, probably for grinding grain, prayers had been read during seven years; then a frail wooden church was built on the shore of the East river, in Pearl st., between Whitehall and Broad sts. Here the people worshipped until 1642, when the famous navigator De Vries said to Gov. Kieft, 'It is a shame that the English, when they visited Manhattan, saw only a mean barn, in which we worshipped; the first thing they built in New England, after their dwelling-houses, was a fine church.' Soon afterward, a subscription paper was passed around at the wedding of a daughter of Dominie Bogardus, with a success due in part, perhaps, to accompaniments of the feast. With John and Richard Ogden, of Stamford, Conn., as contracting masons, a church 72 by 50 by 16 ft. was built within the fort, the present Battery, and called the St. Nicholas; there the people worshipped until 1693, when a new church was ready on Garden st. (destroyed in the great fire 1835). This was the first of the Collegiate Ref. Dutch edifices of New York, and named the South Church when the colleagued North one, corner Nassau and Cedar sts., was dedicated 1729 (not long since used for post-office and now supplanted by the Mutual Life Ins. Building); and this in turn was called the Middle Church when the North one was opened 1769, corner of Fulton st. and 'Horse and Cart lane' (William st.)—now demolished, but memorable for the 'Fulton st. prayer-meetings.' In the progress of time, the Middle became the South Church, when the temple until lately in Lafayette Place occupied a central position, dedicated 1839, and the marble edifice on Fifth ave. and 29th st., finished 1854, was the most northern of the three Col-

legiate churches. Now there are added two Collegiate churches in Harlem, the 'First,' with its tall slender spire of stone, on Lenox ave., and the 'Second,' on East 121st st., besides nearly 20 others within the city limits, belonging to the same denomination. The bell of the old Nassau St. Church, cast in Amsterdam 1731, into the molten metal of which it was said that a number of burghers threw pieces of silver, was paid for by a legacy for the purpose made by Col. Abraham De Peyster, bore a legend 'legacy to the Low Dutch Church of New York,' rang in its place a century, and from its size and far-ringing tones was called the 'Fireman's Bell;' it was, not long since, hanging in the tower of the former Lafayette Place structure, but now rings in the church on Fifth ave. and 48th street.

Among the customs of the old Dutch churches were the black-silk ministerial gown; the psalms of the day posted in conspicuous movable figures; the short silent prayer, with hat-covered face, by the minister before ascending the pulpit; the reading of the Scriptures, and, in the afternoon, reciting the Apostles' Creed, by the clerk in front of the pulpit; his reception of all notices and passing them up on a long pole to the dominie in the high pulpit; the timing of the sermon by an hour glass, watched by the clerk, whose duty was to rap thrice with his cane if the preacher exceeded an hour; and the brief address to the deacons by the preacher before they passed the black-velvet collecting bag, fastened at the end of a pole and with a little bell attached.

This sketch of the origin and rise of the Dutch Church in New York had parallel in many other localities across the East and Hudson rivers, and especially along the rivers of New Jersey and the Hudson and Mohawk. In 1719 a movement was made to rear and ordain ministers, so as not to depend on supply from the mother country. After some years, consent was given to the formation of a synod, which was accordingly constituted, though some conservatives withdrew and formed a separate organization. The disruption was finally healed by a plan of union, effected by Dr. John H. Living-ston 1770. The perfected organization took its present form 1812, and in 1867 the name was changed from Reformed Protestant Dutch Church in N. America to Reformed Church in America.

The old Ref. Dutch polity, which is strict Presbyterianism, has been retained for the most part. There is a consistory, comprising elders and deacons, each serving two years, who have power to call a minister, to receive and dismiss members, and, with few exceptions, are trustees of the church property. The consistory is elected by the church, the synod of 1889 making 18 years of age the limit in the right to vote. Those who have held the office of elder or deacon constitute the 'great consistory,' summoned to advise on unusually important occasions. The classis, corresponding to a presbytery, is constituted of the minister and one elder from each

church in a convenient region. There are now 34 classes, of which 18 are in N. Y.—viz., New York, Long Island, Westchester, Hudson, Kingston, Poughkeepsie, Ulster, Greene, Montgomery, Schoharie, Rensselaer, Albany, Saratoga, Schenectady, N. and S. L. Island, Rochester; 8 in New Jersey: N. and S., Bergen, Newark, Passaic, New Brunswick, Monmouth, Raritan, Paramus, Orange; also, Philadelphia, Michigan, Illinois, Iowa, Wisconsin, Dakota. Groups of classes are united in 'particular synods,' of which there are 4: New York, Albany, New Brunswick, and Chicago, comprising 4 ministers and 4 elders from each classis represented. The general synod, corresponding to the Presb. gen. assembly, is constituted of clerical and lay representatives from each classis.

The doctrinal position of the denomination is firmly intrenched in five creeds, the Apostles', the Nicene, the Belgic, the Canons of Dordrecht, and the Athanasian, the latter the most rigid of the three 'catholic' creeds. The Heidelberg Catechism is required to be gone over in pulpit exposition once every four years, and to be taught in families and Sunday-schools; in the latter its use is exclusive by vote of the gen. synod 1889. Before occurrence of the Lord's Supper, it is enjoined on minister and elders to inquire into the doctrinal and practical good standing of communicants. The Ten Commandments are read at the morning service every Sunday, and the Apostles' Creed usually at afternoon or evening service. The original Holland liturgy, modified and including responsive readings, is not of obligatory use, except the parts provided for sacramental and disciplinary occasions. In 1767 the consistory of the Collegiate Church of New York, on account of the declining use of the Dutch language, moved to substitute Eng.; and in 1789 a book of psalms and hymns in Eng., prepared by the Rev. Dr. Livingston, was approved and came into use. This has been revised and enlarged, or replaced, from time to time; and recently a new hymnal has been prepared. However, 90–100 churches use the Dutch language, and 40–50 the German, composed, doubtless, of comparatively recent settlers and their descendants.

According to the last report of the gen. synod, 1896, there were in this communion 630 churches, 652 ministers, 19 candidates, 57,645 families, 104,694 communicants. There were 886 Sunday schools, with 118,070 pupils, and 409 societies of Christian Endeavor, with 22,500 members. One-third of the members of the church are in the Sunday schools as officers, teachers, or scholars. The contributions to denominational benevolence aggregated $228 356; to other benevolence $121,705; to congregational support and objects $1,005,503. Collections in the Sunday schools were $10,457 for foreign missions, and $6,540 for other objects. The annual total contributed to foreign missions was $154,139.

The foreign missionary work as denominational, in-

dependently of the A. B. C. F. M., began 1857. The principal mission is the N. and S. Arcot, in the Madura district in s. India, organized 1854. There were (1894) 117 outstations, 7 missionaries, 8 asst. missionaries, 9 native pastors, 59 native assistants and catechists, 24 asst. catechists, 86 Anglo-vernacular schoolmasters, 13 readers, 31 schoolmistresses and zenana teachers, 12 colporteurs, 13 Bible readers, 5 zenana women; communicants 1,936, and baptisms of adults not communicants 654. The N. Japan mission, organized 1859, has 5 missionaries and 9 assistants, and the S. Japan 4 of the former, 8 of the latter, and 1 teacher; but much of the work is carried on in connection with the 'United Church' in Japan, and is not reported separately from that. The Amoy mission in China has 11 churches, 14 outstations, 7 missionaries, 13 assts., 11 native ordained, 19 native helpers. The mission in Arabia, organized in 1889, has 4 missionaries. The general statistics of 1896 are a gain of 50 per cent on those of 1886.

The oldest college under the auspices of the denomination is Rutgers (q. v.), at New Brunswick, N. J. Connected with it is a theol. seminary, opened in 1810, and having 8 buildings, a library of 44,000 vols., and a fund of $400,000. Its report for the year ending 1896 May 1, states the income $7,500, expenses $8,200, bequests $2,038; a scholarship fund $141,071; 5 professors and 42 students in the year 1894–5. Hope Coll., at Holland, Mich., founded 1865, has 9 professors, 4 lecturers, 69 collegiate students; and the grammar school has 11 teachers and 140 students; also a theological school. It has a library of 20,000 vols., and, so far as the mixed form of the report gives data, a endowment fund $150,000 and a total investment $123,199. The theol. school connected with it has 3 professors, 1 lecturer, 22 students; and some items of endowment foot up $45,348. The Northwestern Classical Acad., in Iowa, has 72 students and 4 teachers. In all these institutions, the church board of education has 103 students receiving aid. A theol. dept., under William W. Scudder, D.D., is connected with the Arcot mission in India, having 15 students.

For several years negotiations have been in progress looking to union between this body and the Reformed Church in the United States (German). The two bodies have much in common—not only name, but church govt., adherence to the Heidelberg Catechism, and the same sacramental forms and other features of liturgy. Committees from the two gen. synods have met and reported—that of the German synod, 1890, recommending a federal union of the two communions, with a representation that shall have ultimate authority in regard to new missions, both domestic and foreign, new educational institutions, and the departments of religious publication. The report was adopted. On its part, the Reformed Church (Dutch) appointed a committee to draw up a plan of union. If united, the two denominations would have about 2,000 churches, 270,000 communicants, over 1,300 ministers, 20 institutions of learning, and 5 publishing-houses. They are already in

the Alliance of Reformed Churches, characterized by the presbyterial form of govt., and the recent movement was a step toward one national, and perhaps international, Reformed church; but the plan was dropped in 1894.

The organ of the Reformed Church (Dutch) is the *Christian Intelligencer*, of New York, long and well known for its ability and literary excellence. The new *Presb. and Ref. Review* represents this body and the Presb. churches, as its name indicates. Besides these there are the smaller papers devoted to missions or other branches of work.

REFORMED CHURCH IN THE UNITED STATES (GERMAN): lineal descendant of the same church in Germany, which took its type from Melanchthon and Calvin, when a party dissented from Zwingli and Luther and made the Heidelberg Catechism its standard. It assumed form first in the Palatinate, whose elector, Frederick III., appointed certain Heidelberg professors to compose the catechism, published 1563. This became the symbol of Ref. churches, not only in Germany, but also in neighboring countries, including Holland. It is the only creed of this denomination in the United States, and was imported with the first immigrants of that faith 1684, who, with their successors, formed settlements in Penn., and to some extent in the seaboard colonies south. The first known minister of this body, Philip Boehm, came 1720 and settled near what is now called Boehm's Church in Montgomery co., Penn. The first synod was constituted 1747, within a few days after the first synod of the Ref. (Dutch) Church. In 1793 there were nearly 150 churches; and in years following other synods were organized in neighboring states. Not until 1863 was a gen. synod formed, supreme over the others as a court of appeal and advice. It meets once in three years, and, like that of the Ref. (Dutch) Church, is composed of representatives from the classes, which are grouped in local synods.

The Heidelberg Catechism, which defines the doctrines of this church, teaches the natural depravity of man, and salvation by free grace, but differs from the stricter Calvinism in omitting the doctrine of reprobation; it agrees with Calvinism, and disagrees with Lutheranism, in holding only to the spiritual presence in the symbols of the Lord's Supper. Pedobaptism is taught and practiced, but the views of this church incline to what is now known as Christian nurture, involving a constructive membership of the baptized in the church body, to be ratified by individual confession, termed confirmation, on reaching suitable age. In harmony with this practice, approved in theory if not carried out in form by many in various orthodox communions (and ably set forth in Horace Bushnell's *Christian Nurture*), is the entire mode of statement in the 'Mercersburg Theology' (q.v.), advocated by the Rev. Drs. Rauch and Nevin of this denomination. As baptized children of believing parents may be considered as having an organic relation

to the church, not merely under an individual pledge of faithfulness on the part of individual parents, so the church has an organic relation to Christ, lifting it into oneness with him and the Father; and so, also, mankind is an organic unity in sinfulness, from which the redeemed are separated into a new common life. The most peculiar points of the theory were in respect to the sacraments as somehow mystically conveying increased life to the believer, who receives somewhat besides his being simply and individually quickened by their sensible impressiveness and by his own personal communion with Christ on sacramental occasions; also, in respect to regenerating power as conveyed in and through the church—not solely a direct action of the Divine Spirit on the soul, irrespective of the spiritual power residing in the whole body of believers. All this, agreeable to much of the N. Test. language, is regarded now as a quite innocent and suggestive mode of stating spiritual and unfathomable truths, adopted from the phenomena of organic nature, which must furnish much of the imagery of the deeper spiritual facts; and hence this theology, which excited alarm and discussion before German modes of thought had become more or less incorporated into the thinking and expression of English speaking theologians, is now regarded as sufficiently orthodox, or rather as a high form of orthodoxy, provided the element of German philosophico-mysticism does not push the statements so far as to approach a physical theory of spiritual facts, and to lose the great fact of individual responsibility and relations to God in the idea of generic solidarity. German *theology* anticipated by many years the tendency of more recent scientific evolutionism to conceive of everything under the figure of life and growth, in place of the old mechanical conceptions; and, within due bounds, the idea is as helpful as it is misleading when carried to extremes. Analogy is a good servant, but a bad master. The liturgical bearing of the Mercersburg Theology, as well as the theological, gave rise to much discussion. The denomination inherited a liturgy, and it was the subject of agitation ten years since, but harmony was brought about. The use of the liturgy is to a considerable extent optional.

The statistics of the church as reported (1896) are: Classes, 56; ministers, 961; congregations, 1,639; members, 226,572; infant baptisms, 43,075; adult baptisms, 5,480; confirmed, 33,646; received by certificate, 22,619; communed, 182,435; dismissed, 10,594; excommunicated, 77; erasure of names 13,239; deaths, 16,166; Sunday schools, 1,644; officers and teachers, 20,096; scholars, 172,458; students for the ministry, 304; benevolent contributions, $676,271; for congregational purposes, $3,067,780; showing an increase in three years of 76 ministers, 56 congregations, 13,742 members, 6,777 Sunday-school officers and teachers, 23,435 Sunday-school scholars, $26,435 in benevolent contributions, and $45,608 for congregational purposes.

The foreign missions are in India, and especially at Tokio and Sendai in Japan, where there were (1890) 7 preaching stations; 8 churches (of which half were self-supporting); 482 baptisms of adults; 1,202 communicants; 3 schools, with 209 pupils; 16 Sunday schools, with 719 attendants; 1 theol. school, with 9 students; and 7 native preachers. Other missionary work has been done among N. Amer. Indians.

Of educational and charitable institutions there are 8 colleges and universities, 9 academies and institutes, 3 theol. seminaries, and 4 orphanages. The first college founded was at Mercersburg, Penn., 1836. The strongest institution is Franklin and Marshall Coll., organized at Lancaster, Penn., 1853; in 1895 it had 22 teachers, 325 students, productive funds $180,000, other property $250,000; and library of 29,000 vols. Connected with it is a theol. seminary, founded at Carlisle, Penn., moved to Mercersburg 1836, thence to Lancaster. Heidelberg Univ. and Seminary was established at Tiffin, O., 1850 and had (1895) 20 teachers and 288 students; and Ursinus Coll. and Seminary at Collegeville, Penn., 1870, and had (1895) 21 teachers and 180 students. There are also the Palatinate Coll., at Myerstown, Penn.; Catawba Coll., Newton, N. C.; Calvin Institute, at Cleveland, O.; and a theol. seminary at Howard's Grove, Wis., besides classical and female schools. The orphanages are at Womelsdorf, Berks co., and Butler, Butler co., in Penn.

REFORMED CHURCH IN THE UNITED STATES, THEOLOGICAL SEMINARY OF THE: oldest theol. seminary of the Reformed Church in the United States: founded at Carlisle, Penn., 1825, with one professor and five students. In 1829 it was removed to York, and 1837 to Mercersburg, where, in connection with Marshall College, having in its faculty such eminent men as Nevin and Schaff, it had great prosperity, and became famous as the home of 'Mercersburg Theology' (q.v.). When Marshall College was removed to Lancaster the seminary remained at Mercersburg. Thirty-five years later the seminary also was removed to Lancaster. It is under the control of the three eastern synods (English) of the Reformed Church. There are four or five fully endowed professorships, besides a teacher of elocution. The library contains about 12,000 vols. The students in attendance number about 60. The pres. is Emanuel V. Gerhart, D.D., LL.D.

REFORMED CHURCHES: term employed in a conventional sense, not to designate all the churches of the Reformation, but those in which the Calvinistic doctrines and still more the Calvinistic polity prevail, in distinction from the Lutheran (q.v.). The influence of Calvin proved more powerful than that of Zwingli, which, however, no doubt considerably modified the views prevalent in many of these churches. The R. C. are very generally known on the continent of Europe as the *Calvinistic Churches*, while the name *Protestant Church* is in some countries almost equivalent to *Lutheran*. One chief distinction of all the R. C. is their doctrine of the Lord's

Supper, characterized by the utter rejection not only of transubstantiation, but of Lutheran views of the presence of the body and blood of Christ in the elements—the point mainly of the long controversy between the Lutherans and the Reformed: see LORD'S SUPPER: SACRAMENTARIAN. The R. C. are unanimous also in rejection of the use of images in worship, and of various ceremonies which the Lutherans have thought proper to retain. Among the R. C. are those both of England and Scotland, notwithstanding the episc. government of the former; the Prot. Church of France, that of the Netherlands, many German churches, the Prot. churches of Hungary, Poland, etc.; with those in America which have sprung from them.

REFORMED EPISCOPAL CHURCH: see EPISCOPAL CHURCH, REFORMED.

REFORMED PRESBYTERIAN CHURCH IN NORTH AMERICA, called frequently THE COVENANTER CHURCH: descendant of the church in Scotland of that name: see CAMERONIANS. Its origin, though not its constitution, dates back to the National Covenant of Presb. reformers in Scotland, 1580, the object of which was to combine against the schemes of the Papal Church. The attempt of James VI. (I. of England) to introduce episcopacy into Scotland 1617, followed by a similar effort by Charles I. 1637, brought about a renewal of the covenant (1638) and armed resistance, which, after some postponement, resulted in defeat of the king. The opposition to him by the Long Parliament, and the massacre of Protestants in Ireland, precipitated a crisis that led, 1643, to adoption of another pledge, known as the Solemn League and Covenant, which had in view the establishment of the non-prelatical Reformed religion throughout the United Kingdom: see COVENANTS. The Westminster Assembly's creed was adopted in Scotland 1647, and the next year the organization of the Ref. Church further perfected. Many years of persecution attended the effort of Charles II. to impose prelacy on the Scots; and, when William and Mary gave royal sanction to Scotch Presbyterianism, but asserted royal authority over the Ref. churches, those which dissented from such supremacy dispensed with ministers rather than give up their ecclesiastical freedom. Thus the sovereign headship of Christ over the nation became a cardinal principle of the Ref. Presb. Church, both in Scotland and in America, explaining a disruption of the body in the United States, and its attitude toward the question of 'God in the constitution.' In 1706 the Rev. John McMillan, and 1743 the Rev. Mr. Nairn, joined the pastorless flocks in Scotland, reconstituting in regular form the Ref. Presb. ministry.

In 1752 the Rev. John Cuthbertson, of this ministry, came to this country, followed by the Rev. Messrs. Linn and Dobbin 1774, in which year a presbytery was formed; but in 1782 it was partly merged in a new Associate Ref. church—a body made up of Ref. Presbyterians, the subject of this article, and of certain dissenters from the established church of Scotland who were known as Associate Synod. Those of the latter who would not agree to the union continued under their name until 1858, when they united with the Associate Ref. Church, under the designation United Presb. Church. Those of the Ref. Presb. Church who would not enter into the Associate union, 1782, maintained their name, and were cared for by ministers who came to this country, the Rev. James Reid arriving 1790 and beginning the work of founding a church in New York. The Rev. Messrs. McKinney and King, with the Rev. Mr. Gibson from Ireland, constituted a presbytery 1798, under the name the Rev. Presbytery of the United States of N. Amer.

They reaffirmed the Presb. system so far as it 'binds to duties not peculiar to the church in the British Isles, but is common to all lands.' In particular, they discarded in worship the use of instrumental music and of hymns of human composition—a principle still adhered to strictly by churches of this order in New York and elsewhere, the old Scotch version of the Psalms revised only being used. The R. P. Church in New York was a pioneer in Sabbath-school and anti-slavery work. Opposite its oldest church, in Chambers st., was the city almshouse, and there a member of the church, the widow Grant Bossing, began a Sabbath-school for poor children near the beginning of this century. Dr. Alexander McLeod the first pastor, ordained 1801, published a sermon 1802, *Negro Slavery Unjustifiable*.

In 1809 a synod, representing three presbyteries, was formed in Philadelphia; and 1823 a Gen. Synod was constituted, composed of delegates from the presbyteries.

The doctrinal standards are the Westminster Confession of Faith, Catechisms, Larger and Shorter, and *Reformation Principles Exhibited*; and these have been interpreted more or less in the *Christian Expositor*, edited by Alexander McLeod, D.D., of New York, who also published an *Ecclesiastical Catechism*. The *Reformation Principles*, issued 1807, was republished 1833, with a note, showing that in receiving the Westminster Confession, the church did not assent to investing civil magistrates with power in ecclesiastical affairs.

During the early history of the church in the United States, the members generally refrained from voting in civil elections on account of slavery, and because there was not in the United States constitution a distinct recognition of God as Supreme Ruler.

In 1831, Aug., General Synod met in Philadelphia, when the following resolution was passed: '*Resolved*, that this Synod recommend that the points of difference in the application of our principles to the civil institutions of the United States be discussed through the medium of *A. C. Expositor*, under the head of *Free Discussions*, and that every member of Synod have full liberty to avail himself of this public vehicle.'

In 1833, at Philadelphia, while General Synod was in process of organization, about half of the ministers and ruling elders precipitately withdrew, and organized another synod, which has since been known as the Synod of the Reformed Presbyterian Church (see below). These two synods stand practically on the same doctrinal platform, the only difference being that in reference to civil relations, the General Synod stands on the resolution of 'Free Discussions,' leaving the question with the citizen himself, provided no relation involving immorality be assumed, while the Synod professes to make it a term of fellowship that none of its members shall vote or hold office under the U. S. constitution. The R. P. Church took action in 1800 that no slave-holder should be admitted to full communion.

The General Synod numbers (1896) 7 presbyteries, 50 congregations, and about 6,500 communicants, besides a large number of adherents. The theological seminary is in Philadelphia, with 3 professors and 12 students.

Two literary institutions are connected with General Synod, one in Cedarville, Greene co, O., the other in Minneapolis, Minn. The foreign mission, established 1836, is in northern India; comprising 588 communicants, 6 congregations, 7 boys' schools with 184 pupils; 4 girls' schools with 95 pupils; 1 orphanage, and 1 Soc. of Christian Endeavor. The funds of the church include endowment and Lamb Funds $60,000, sustentation fund $10,000. Contributions for home and foreign missions amount to $8,000 yearly, besides bequests and smaller funds.

The Synod of the Reformed Presbyterian Church (previously referred to) numbers (1896) 124 churches, 124 ministers, and about 10,000 communicants. Its theol. seminary is in Allegheny, Penn., with 3 professors and 16 students; one college, in Beaver Falls, Penn., a foreign mission in Syria, established before 1850, with missions among the freedmen, the Jews, and Chinese.

REFORM' SCHOOLS: schools for the reformation and education of Juvenile Offenders (q.v.). According to the 1890 census, there are about 56 reform schools in the U. S. These institutions exist in all the states of the North Atlantic division: in most of the North Central; and in two or three each of the other divisions. Of the inmates, 11,535 were boys and 3,311 girls, the latter in separate departments or institutions, and the distribution was as follows: N. Y., 3,675; O., 1,529; Penn., 1,154; Md., 1,061; Mass., 698; Mich., 696; Ind., 636; Conn., 626; N. J., 608; Wis., 591; Io., 527; Ill., 383; Mo., 360; Minn., 284; Ky., 273; R. I., 270; Neb., 237; Kan., 208; Cal., 206; D. C., 187; Me., 169; Colo., 149; N. H., 102; La. and Vt., 86 each; Del., 45. Excluding colored juvenile delinquents, 12,903 were white, and of these 11,078 were native and 1,405 foreign born. The industrial schools teach agriculture, carpentry, shoe-making, and other occupations, including printing, tailoring, cane-seating, cigar-making, brush-making, and hosiery. In nearly all of these schools the pupils do the baking, laundry-work, etc. The duration of work ranges from 1½–6 hours daily in the school rooms, and 1½–10 hours daily in the industries. Industrial training is growing in favor rapidly in R. S., printing and shoe-making being the most popular.

The first institution in Eng. was a reformatory for girls, established at Chiswick 1834, the Victoria Asylum, founded by Capt. Brenton. Conferences in Birmingham, 1851 and 53, led to four Reformatory School acts 1854–57, consolidated 1866, establishing in English criminal jurisprudence the principles that remedial imprisonment for children be substituted for punitive; that the work of reform be intrusted to voluntary earnest laborers; and that the criminal or neglectful parent be compelled to pay something toward the reformation of his child. In two English schools 65 and 75 per cent. of the inmates were reclaimed; at Mettray in France 85 per cent.: at the Rauhes Haus, Hamburg, 91 per cent.; and similar results are reported in the United States.

REFORTIFY, v. *rē-fôr'tĭ-fī* [*re*, again, and *fortify*]: to fortify anew.

REFOUND, v. *rē-fownd'* [*re*, again, and *found*]: to found or cast anew; to re-establish.

REFRACT, v. *rē-frăkt* [F. *réfracter*, to refract—from L. *refractus*, broken up or in pieces—from *re*, back; *fractus*, broken; *frangĕrĕ*, to break: It *rifrangere*, to deviate from]: to break, as the natural course of the rays of light; to cause to deviate from a direct line, as rays of light. REFRACT'ING, imp. REFRACT'ED, pp.: ADJ. bent back at an acute angle. REFRACT'IVE, a. *-frăkt'iv*, allowing or favouring refraction. REFRAC'TION, n. *-shŭn* [F.—L.]: the bending of a ray of light toward the perpendicular when it passes into a denser medium, as from air into water, and from the perpendicular when it passes into a rarer medium, as from water into air (see REFRACTION OF LIGHT): in *mech.*, the incurvation or change of direction in the body moved: in *astron.*, apparent angular elevation of celestial bodies above their true places, caused by the refracting power of the atmosphere. CONICAL REFRACTION, refraction of a single ray in the form of a cone of rays. In certain cases, light, passing as a single ray through a plate of a crystallized body, emerges as a hollow *cone* of rays; and in others, a single ray, falling on the plate, becomes a cone inside the crystal, and emerges as a hollow cylinder. These extraordinary appearances were *predicted* from theory by Sir William R. Hamilton (q.v.), and experimentally realized by Lloyd. They form one of the strongest arguments for the Undulatory Theory of Light: see that title for description of these appearances in connection with the theory of double refraction in biaxal crystals. DOUBLE REFRACTION, refraction of light in two directions and consequent production of two distinct images, as in certain crystals. The great majority of crystallized bodies, and in general all transparent bodies (e.g. glass), when unequally strained, as by pressure, heat, or rapid cooling, divide a single ray which falls on their surface into two. Through a plate of such a substance, every object appears doubled. For the cause of this singular phenomenon, which cannot be explained without reference to Polarization (q.v.), see UNDULATORY THEORY OF LIGHT, under which title are given the principal experimental facts, with their theoretical explanation.

REFRACTION OF LIGHT: the bending of the ray of light when passing from one medium into another: see DIOPTRICS: HEAT: DOUBLE REFRACTION (under REFRACT): UNDULATORY THEORY OF LIGHT. Under these titles the ordinary experimental laws of single and double R. are stated; geometrical consequences, such as the mode of action of lenses, prisms, telescopes, and microscopes, are deduced from them; and the connection of these laws with the hypothesis of undulations is explained.

It remains to give the refractive and dispersive powers of a few common substances, to show the great diversity among them, especially in the non-proportionality of dispersion to refraction. The following results are due to Fraunhofer, who was the first to employ for this pur-

pose Wollaston's discovery of the *fixed lines* in the Spectrum (q.v.), without whose aid all such observations are of comparatively little value. The lines B, D, and H, which we have selected for the table, correspond to definite rays of red, orange, and violet respectively.

Substance.	Refractive Index.			Dispersion.
	B.	D.	H.	H—B.
Flint-glass	1·6277	1·6350	1·6710	0·0433
Crown-glass	1·5258	1·5296	1·5466	0·0207
Water	1·3310	1·3336	1·3442	0·0132
Turpentine	1·4705	1·4744	1·4939	0·0234

The numbers in the last column roughly show how far the red and violet are separated by prisms (of a given angle) of the various substances; and even this brief list shows how erroneous was Newton's idea that dispersion is proportional to refraction, an idea which led him to the conclusion that an Achromatic (q.v.) combination was impossible.

Thus we see that the refractive indices of flint and crown glass are (approximately) as 16 : 15, while the dispersive power of flint is more than double that of crown.

Hence, if we construct prisms of the two materials, such that the angular separation of red and violet which they produce shall be equal, the angle of the flint will be far less than that of the crown, and the whole refraction also less. The combination of two such prisms, with their edges turned opposite ways, as in the cut, will thus bend (or refract) a ray of white light without separating the red from the violet—and thus we may obtain *refraction without color*.

This is not strictly the case, on account of what is called *Irrationality of Dispersion*, whose existence appears from the above table. Thus, if we form two spectra, by means of properly constructed prisms of different media, such that the lines B and H coincide, the lines D will not generally coincide. In other words, some substances draw out the red end of the spectrum more than the violet—and *vice versa*. Thus, from the above table,

	D—B.	H—D.
Flint-glass	0·0073	0·0360
Crown-glass	0·0038	0·0170

But 73 : 360 :: 38 : 187; hence we see that the distance from B to D in flint bears a less proportion to that from D to H than it does in crown. Thus if, by proper arrangements, as before mentioned, B and H be made to coincide, D will be nearer the middle of the crown spectrum than of the flint. Hence a double achromatic lens, composed of flint and crown, may be made to refract equally any *two* colors of the spectrum; but there will be a slight non-accordance of the remaining colors. *Three* colors may be made coincident by using a *triple* lens, but this is now rarely constructed. See further under REFRACT.

REFRACTORY, a. *rē-frāk'tėr-i* [L. *refractārius*, stubborn; *refractus*, broken up (see REFRACT: F. *réfractaire:* Sp. *refractario*]: difficult to manage; obstinately unyielding; perverse; in *chem.*, difficult of fusion. REFRAC'TORILY, ad. *-li.* REFRAC'TORINESS, n. *-nės*, perverse or sullen obstinacy.—SYN. of 'refractory': stubborn; obstinate; perverse; unruly; contumacious; unmanageable; ungovernable.

REFRAGABLE, a. *ref'rā-gā-bl* [L. *refrāgor*, I oppose or resist—from *re*, back; *frango*, I break]: that may be opposed or resisted; capable of refutation.

REFRAIN, v. *rē-frān'* [L. *refræno*, I hold back or in with a bridle, I check—from *re*, back; *frænum*, a bridle: It. *raffrenare:* F. *refréner*]: to restrain; to keep from action; to keep one's self from action or interference; to forbear. REFRAIN'ING, imp. REFRAINED', pp. *-frānd'*. —SYN. of 'refrain': to withhold; abstain; forbear; hold back; curb; govern.

REFRAIN, n. *rē-frān'* [F. *refrain*, a refrain—from OF. *refraindre*, to break—from L. *refrangĕrĕ*, to break in pieces—from *re*, again; *frangĕrĕ*, to break: Sp. *refran*, a proverb]: the burden of a song or piece of music—so named, as it *breaks up* a song into equal parts—being repeated at close of every stanza.

REFRAME, v. *rē-frām'* [*re*, again, and *frame*]: to frame anew.

REFRANGIBLE, a. *rē-frăn'jĭ-bl* [F. *réfrangible;* It. *refrangibile*, refrangible—from L. *re*, again; *frango*, I break in pieces]: capable of being turned out of a direct course when passing from one medium into another, as rays of light passing from air into water. REFRAN'GIBIL'ITY, n. *-bil'i-ti*, the disposition of rays of light to be turned out of their direct course in passing from one medium into another.

REFRESH, v. *rē-frĕsh'* [*re*, again, and *fresh*, which see: mid. L. *refrescārĕ;* OF. *refreschir;* F. *rafraîchir*, to refresh]: to relieve or revive after fatigue or depression; to give new strength to; to invigorate; to improve by new touches. REFRESH'ING, imp.: ADJ. reviving; reanimating: N. relief after pain, fatigue, or want. REFRESHED, pp. *rē-frĕsht'*. REFRESH'INGLY, ad. *-li.* REFRESH'ER, n. *-ėr*, one who or that which refreshes; a fee to insure attention or expedition, as to a counsel. REFRESH'MENT, n. *-mĕnt*, new strength or vigor received after fatigue or depression; that which strengthens or invigorates, as food or rest.—SYN. of 'refresh': to revive; renovate; renew; refrigerate; invigorate; reanimate; restore; recreate; enliven; cheer.

REFRIG'ERANTS, in Medicine: internal and external cooling remedies. Those for internal use cause a refreshing feeling and a sensation of coolness throughout the system, though they do not in reality diminish the temperature of the body. Their principal use is in the treatment of febrile and inflammatory affections, in which the benefit that they produce appears to depend on the fact that their direct action on the coats of the stomach occasions, by nervous sympathy, a temporary reduction in the force of the circulation: they likewise have the power of allaying gastric irritability and the morbid sensations of heat and thirst.—The following are the most usual internal R.: citric and tartaric acids taken in combination with bicarbonate of potash as effervescing draughts, ripe oranges, lemons (in the form of Lemonade, q.v.), chlorate of potash (ten grains dissolved in water, and sweetened with syrup, to be taken every second hour), and nitrate of potash, which may be taken in the same manner as the chlorate, or as *nitre-whey*, which is prepared by boiling two drams of nitre in a pint of new milk; the strained milk may be given in frequent doses of two or three ounces: the nitrate and chlorate, however, should be given only under professional advice. Many European physicians regard oxalic acid in the form of lemonade as the best of all refrigerants. Its poisonous character must not be forgotten; but five grains dissolved in half a pint (or more) of water may be taken (under medical advice) in divided doses, in the 24 hours, with safety.

The following remarks on external R. are mostly condensed from Mr. Simon's article on 'Inflammation' in Holmes's *System of Surgery*. Cold, continuously applied, is the sedative of every vital manifestation; and in theory it may be regarded as being in direct and essential opposition to the causes of inflammation; and as it is thus an antidote to the causes of inflammation, rather than a remedy for the resulting changes, so, in order to get full advantage from its use, it should be employed from the moment when these causes begin to operate. Cold is of great value in the treatment of wounds, especially such as are made in surgical operations. The local temperature can be thus continuously moderated, care being taken that it is not too much reduced, so as to occasion gangrene. Under the effective use of cold (together, of course, with absolute rest of the parts), many a knee-joint, whether wounded accidentally or by a surgical operation, recovers without permanent injury. In most cases, local cooling is best effected by water of the desired temperature. Cloths wetted with it are spread over the surface which is to be acted on, their original low temperature being retained either by their being continuously dripped upon by means of a bundle of threads inserted in a reservoir of cold water, and acting like a siphon, or by their being frequently rewetted or changed. Their surface should be exposed as freely as possible to the air, so as to se-

cure ample space for evaporation. In cases where great cold is required—e.g., strangulated hernia, inflammation of the brain and its membranes, or fever with well-marked cerebral symptoms—bladders of pounded ice are preferable to wetted cloths. Both as regards the degree of cold and the period of its application, the surgeon should to a considerable degree be influenced by the sensations of his patient. When its application gives comfort, it is almost certain to be doing good; and in most cases where it gives discomfort, it is doing harm.

A notice of external R. would be imperfect without reference to the memoir of Dr. Esmarch, prof. of surgery in the Univ. of Kiel. *On the Use of Cold in Surgery*, translated by Dr. Montgomery for 'The New Sydenham Soc.,' 1861. His mode of application is by means of India-rubber bags filled with ice, snow, or some freezing mixture; or of thin iron-plate reservoirs of cold water, made to adapt by means of a bed of gutta-percha to fit any inflamed part. In a case of 'chronic purulent inflammation of the knee-joint,' the ice-bags were continuously applied 12 weeks. See also Dr. James Arnott's investigations on 'Local Anæsthesia by Cold,' in *Medical Times* for 1854.55.57; and Dr. Chapman's method of treating nervous diseases by application of cold to the spine, as recorded in *Functional Diseases of Women* and elsewhere.

The application of cold, either through the medium of air or water, to the body generally is a subject of great importance. The use of cold air is seen in febrile cases, in which the physician directs the sick-room to be kept cool, and the patient (unless in exceptional cases) lightly clothed. Paget reports that the most successful results in pyæmia that have fallen under his observation were those in which the patients were freely exposed to the air. For the value of baths and cold affusions, see Bath - Bathing: Hydropathy. In addition it is important to know that prolonged immersion in water as warm as 95° F. may be the means of reducing febrile temperature.

REFRIGERATE, v. *re-frij'er-āt* [L. *refrigerātus*, made cool or cold—from *re-*, again; *frīgus*, cold: It. *refrigerare*, to refrigerate: F. *réfrigérant*, cooling]: to make cold or colder; to lessen the heat of: to refresh. Refrig'erating, imp. Refrig'erated, pp. Refrig'erant, a. *-ant*, cooling; allaying heat: N. a medicine which cools or abates heat (see Refrigerants, in Medicine). Refrig'erator, n. *-ā-tėr*, a vessel for cooling liquids, or for condensing hot vapors into liquids (see Refrigerating Machines). Refrig'era'tory, a. *-ėr-ā-tėr-i*, cooling: N. the vessel or apartment in which hot liquids are cooled, or hot vapors condensed into liquids—same as *refrigerator*. Refrig'era'tive, a. *-ā'tiv*, cooling: N. a medicine that allays heat. Refrig'era'tion, n. *-ā'shŭn* [F.—L.]: act or state of being cooled; abatement of heat: see Refrigeration of the Earth.

REFRIG'ERATING MACHINES: apparatus for producing ice, or for decided lowering of temperature: see ICE. Such apparatus is now of increasing importance. The production of cold artificially is effected by various means, involving the use of more or less complicated machinery. When a body, in the broad sense, is rarefied, passing from the solid to the liquid or to the gaseous state, or from the liquid to the gaseous state, or, being a gas, expands against pressure, energy is expended. Hence energy must be supplied to the body in question when acting as described. This energy is practically supplied as heat. If none is directly applied, and the rarefaction is produced without heat, then the body expends its own heat energy in the mechanical or physical work of rarefaction, and grows cold. In the well-known phraseology, its heat becomes latent. This general principle is utilized in refrigerating or ice machines.

The most familiar one in everyday life is the ice-cream freezer, depending on the liquefaction of ice. Salt possesses a slight affinity for water. Mixed with ice, it tends, in a limited sense, to combine with it, and can do so only by liquefying it. The ice, in changing from the solid to the liquid state, does work, and heat energy is expended, causing a lowering of the temperature. When a solid dissolves in water, it undergoes the change from the solid to the liquid state, and absorbs heat. Ice machines have been based on this principle. Ammonium nitrate is a favorite salt for the purpose. Such machines consist of a vessel in which the solution is effected. This vessel should be of non-conducting material. Within it is placed a vessel of thin metal, containing the water to be frozen. The salt used is placed around the metal vessel; the proper amount of water, which may have been previously refrigerated by the same process, is added; the mixture is well stirred, and the temperature rapidly falls. After some time a more or less perfect cake of ice is produced. (See FREEZING MIXTURES.) There are many freezing mixtures which can be used in processes of this type, of which a number are here given. It is interesting to recall in this connection the old method of cooling water by gunpowder. The latter, containing potassium nitrate (saltpetre), cools water to a small extent when added to it, and can be used with water in the outer vessel of an ice-cream freezer or of an extemporized water-cooler, for cooling water.

FREEZING MIXTURES.

	Parts by weight.	Cooling in degrees F.
1. Sodium sulphate.....	8	From plus 50° to 0°
Hydrochloric acid....	5	
2. Sodium sulphate.....	3	From plus 50° to −3°
Dilute nitric acid... ..	2	
3. Sodium sulphate.....	6	From plus 50° to −14°
Ammonium nitrate. .	5	
Dilute nitric acid.....	4	
4. Snow or ice	3	From plus 20° to −14°
Calcium chloride.....	4	

Many other mixtures could be given. A mixture of

ammonium nitrate and ammonium chloride in equal parts, with enough water to dissolve them, gives good results.

The volatilization of liquids is one of the most widely applied principles in commercial ice machines. If a vessel containing water is connected with an air-pump, and a vacuum is produced causing it to evaporate rapidly, it grows cold. If the vapor of water evolved is collected in sulphuric acid so as to make the vacuum almost perfect, the water will freeze. This principle has been applied on a limited scale in practice. It is found advantageous to use more volatile liquids, such as ether, light petroleum hydrocarbons, or ammonia (NH_3), the latter either in strong aqueous solution or anhydrous. Ammonia is very extensively used for the purpose. There are many familiar instances of the application of this principle. If a glass bottle containing water be covered with a cloth kept constantly wet by application of water, the evaporation from the wet cloth will soon diminish the temperature of the contents of the bottle, and if the cloth were moistened with alcohol, or with ether, the cold would be proportionally greater, the degree of cold varying with the rapidity and extent of the evaporation. Wine-coolers, or water-coolers, made of porous earthenware, act in the same manner as the cloth. They are soaked in and saturated by water, which by its evaporation occasions cold. Coolers of this kind are common in most hot countries. On the ancient monuments of Egypt, a man is sometimes represented as fanning these vessels with a palm-leaf, to promote evaporation, and the Arabs in that country still practice this custom.

In some parts of India, where the dryness of the air allows considerable evaporation, ice is obtained in the following manner: 'Flat, shallow excavations, from one to two ft. deep, are loosely lined with rice-straw, or some similar bad conductor of heat, and upon the surface of this layer are placed shallow pans of porous earthenware, filled with water to the depth of one or two inches. Radiation (see HEAT) rapidly reduces the temperature below the freezing-point, and ice is formed in thin crusts, which are removed as fast as they are produced, and stowed away in suitable ice-houses.' — Miller's *Elements of Chemistry*, 2d ed., I., 226.

Generally the cooling liquid is kept apart from the objects cooled. Of this class of R. M., producing cold by evaporation of some volatile liquid, the ice-making machine of Carré & Co., of Paris, is one of the simplest and best (see figs. 1, 2). It consists of two strong cast-iron cylinders A and B, connected by a metal tube T, all perfectly gas-tight. The whole apparatus is made strong enough to stand seven or eight atmospheres of internal pressure.

The cylinder A is charged with an aqueous solution of ammoniacal gas. Ammonia is a powerful absorbent of heat, and is, moreover, so extremely soluble in water

that the water takes up nearly 700 times its volume of the gas. Air is completely expelled from the apparatus by opening a screw-valve and heating the cylinder. It is then ready for use. On applying heat to the cylinder A (fig. 1), which fits into a small stove for the purpose, the ammonia is volatilized from the solution in A. The heat reaches to about 220° F., and while it is being applied the volatilized ammonia condenses into a liquid under very high pressure, produced by its own atmosphere, in the cylinder B, which is immersed in cold water. The liquid thus collected in B consists of ammonia with about $\frac{1}{10}$ its weight of water. Most of the water remains in A. When the heating has gone on long enough—about half an hour for a small machine—the hot cylinder, A, is removed from the fire, and placed in a vessel of cold water, as shown in fig. 2. The cooling of this cylinder immediately causes the reabsorption, by the water in A, through the removal of the pressure,

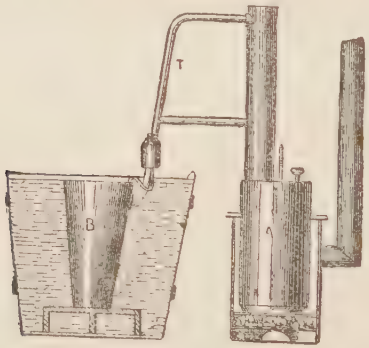


Fig. 1.

of the condensed ammonia from the other cylinder, B; and as it passes again from the liquid to the gaseous state, intense cold is produced, and, in consequence, heat abstracted from everything in contact with this portion of the apparatus.

The cold cylinder, B, is shown in section in fig. 2. It is so constructed that the ammonia is contained in an outer jacket, leaving a hollow space in the centre. When ice is to be made, the latter is filled with salt water, alcohol, or other liquid which does not freeze at 32° F., and into this is placed a loosely fitting metal cylinder D, containing the water to be frozen. In this way, with a small machine for domestic purposes, a few pounds of ice can be made in an hour or two; but large machines, on the same principle, are made which produce 800 lbs. of ice per hour.

There is a well-known refrigerating machine by D. Siebe, of London, in which ether is used as the volatile fluid, its evaporation being produced not by heat,

but by the action of an air-pump: the necessary cold is produced in the surrounding brine as the ether passes into vapor.

The apparatus invented by Pictet, of Geneva, has acquired very extensive use: it is an ice machine which works with anhydrous sulphurous acid instead of ether; but otherwise his process somewhat resembles Siebe's.

The liquid-agent freezing machines may be divided into absorption and compression machines. The Carré machine is an example of the first. In the compression machines no solvent is used. Compression alone liquefies the volatile liquid, and after cooling it is allowed to expand and is again liquefied by compression, thus completing the cycle. Anhydrous ammonia is sometimes used in this class of machine, and the Siebe and the Pictet machines above mentioned are in the same category.

The next type of machine is the atmospheric refriger-

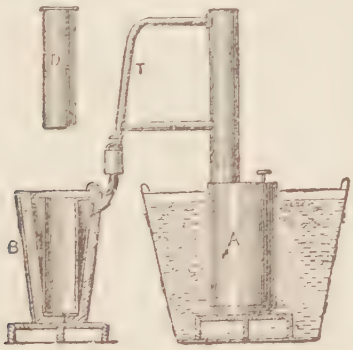


Fig. 2.

ator. This comprises a pump for compressing air. As work is done upon the air, it becomes hot. By water-spray or otherwise, it is cooled. If now permitted to expand against pressure, it becomes cool. In modern machines the air after compression is passed through a separator which withdraws the precipitated moisture. The cooling of the compressed air is effected in a multitubular condenser. The cooled air expands in an expansion cylinder, and in so doing helps to drive the compressing machinery—this cylinder having a piston and being connected to the crank of the motor engine. The air may be compressed to 2 or 3 atmospheres, and in the expansion cylinder is allowed to expand until atmospheric pressure is attained. The piston then returns and expels the cold air into any desired place, a refrigerating chamber, cold-air flues, etc. The expansion cylinder may be double-acting, so as to maintain an almost constant delivery of cold air. For making ice

the air is caused to pass through the freezing tank, while the water is introduced in spray, falling through the cold air and freezing into large blocks. Immense cakes of ice can thus be made. The cold air as it leaves the freezing chamber can be again compressed and used again, with an increase in economy.

The cold produced by R. M. is distributed frequently by brine pipes. These are pipes through which brine or calcium chloride solution is passed. The pipes include a cooling coil or other arrangement where their contents are refrigerated. The liquid is kept circulating in them, and their surfaces soon become coated with a thick covering of ice from the moisture in the air. Rows or coils of such pipes may be introduced into refrigerators and take the place of ice.

Breweries and slaughter-houses make extensive use of these machines. They are extending in application for making ice to be sold in competition with the natural product. Often distilled water is thus treated, to insure absolutely pure ice. They are very often placed on ocean steamers to preserve food, or to refrigerate meat in course of transportation from New Zealand, Australia, or other cattle-raising countries.

REFRIGERATION OF THE EARTH: decrease of the earth's temperature. That the earth is at present losing heat is an immediate consequence of the observed fact that the temperature of its crust *increases* as we descend; for, in any conducting body, the flux of heat is always from warmer to colder parts; and the rate at which heat is thus lost can be easily calculated if we know the conducting power (for heat) of the rocks forming the crust, and the rate at which the temperature increases with the depth under the surface; for the conductivity may be measured by the quantity of heat which, in unit of time, passes (per sq. ft. of surface) through a layer of rock of one ft. thickness, whose upper and lower surfaces are maintained at temperatures differing by 1° F. Hence, if k be the conductivity of the crust, and if the temperature increases by 1° F. every x ft. of descent, the quantity of heat lost, in unit of time, from each sq. ft. of surface, is measured by $\frac{k}{x}$. k and x can be determined by experiment for any particular locality, and thus the loss may be determined. These quantities vary very much in value in different localities: thus x is sometimes as great as 110, sometimes as small as 15. The value 50 is generally supposed to give a fair average—that is, for every 50 ft. of descent the temperature increases by 1° F.; hence the stifling heat in deep mines. At the depth of a mile, the temperature would on this estimate exceed that of the surface by more than 100° F. Beds of coal at such a depth could not be wrought, as the temperature would far exceed that of tropical climates.

Three methods of accounting for this increase of tem-

perature toward the interior of the earth have been proposed: 1. That the earth was originally molten, either throughout, or for a considerable depth over the whole surface; 2. That the internal heat is due to chemical combination; 3. That the earth, ages ago, passed through a region of space where the temperature was far above that of its present envelope.

Of the first hypothesis it is sufficient to say that such a state is the necessary consequence of impact, if the earth was formed by aggregation of cosmical masses due to their mutual gravitation. It is scarcely doubted now that this is the origin of solar and stellar heat; and the fact of the moon's turning always the same face to the earth (see ROTATION) is most easily explained on the hypothesis of her original fluidity. The figure of the earth (see EARTH) is also a strong argument in favor of this hypothesis. This explanation of the origin of the earth's internal heat is obviously consistent with the increase of temperature as we descend below the surface—for a spherical mass of molten rock will evidently soon cool externally, while its low conductivity rendered still lower by the high temperature, will prevent the interior from supplying anything at all equivalent to the loss at the surface. On this hypothesis, the rate of loss of heat must constantly become smaller and smaller, but very slowly; and it is possible that considerable areas of the earth's mass may still be in a melted state. The doctrine, accepted a few years ago, that the earth is in a molten condition, except a comparatively thin external shell, has been measurably disproved by the calculations of Hopkins and others, which go to show that the mass of the earth is astronomically as rigid as cold iron.

The second hypothesis is perfectly sufficient to account for observed facts, but is apparently unnecessary, since the first has been shown to be, in the universe, *a vera causa*. It is alluded to here only because Lyell and other distinguished geologists have endeavored to show from it that the earth need not be losing heat on the whole—a result perfectly untenable. They suppose the internal heat to be generated by chemical combination, and then that the compounds so formed are again decomposed by electric currents produced by the heat (see THERMO-ELECTRICITY), and are thus prepared to combine again, and reproduce the heat. Were this the case, we should have a Perpetual Motion (q.v.); and, in the present state of science, this is known to be impossible.

The third hypothesis, proposed by Poisson, is easily shown inconsistent with known facts; for, if the passage through the warm region be supposed to have taken place 1,250 to 5,000 years ago, the temperature at the earth's surface must have been from 25° to 50° F. above the present mean temperature, which is inconsistent with history. If it took place 20,000 years ago, the mean temperature must have been 100° F. above the present temperature. Geology shows that this cannot

be accepted. And, if it be supposed to have taken place more than 20,000 years ago, the requisite temperature must have been incompatible with existence of animal or vegetable life.

From the above argument, from a paper by Sir William Thomson in *Transactions of the Royal Society of Edinburgh* (1862), it is obvious that the first hypothesis is that which we must, in the present state of our knowledge, adopt.

Supposing the temperature of melting rock to be 7,000° F. to 10,000° F. (and experiments seem to show that it is between these limits), the present temperature of the crust indicates that the earth became solid between 100,000,000 and 200,000,000 years ago. These estimates are based on the known laws of conduction of heat discovered by Fourier, and the conductivity of rocks and soils, deduced by Principal Forbes (q.v.) from observations in the neighborhood of Edinburgh. But as these observations refer to conductivity at very moderate temperatures only, and as Forbes has shown that conductivity is in general lowered by heating, the limit 100,000,000 years, above, may possibly be reduced to 20,000,000.

How little the internal heat of the earth has to do with surface temperature is indicated by the fact that Thomson has shown (*Proc. R. S. E.*, 1863-4) that if we accept the estimate of 1° F. of increase of temperature for 50 ft. of descent, the earth's surface is heated (by conduction of heat from within) only $\frac{1}{75}$ of a degree Fahrenheit.

REFT, v. *rĕft:* for **BEREFT**: see under **REAVE**.

REFUGE, n. *rĕf'ūj* [F. *refuge*—from L. *refugĭum*, an escape, a place of refuge—from *re*, back; *fugĕrĕ*, to flee: It. *rifugio*]: that which shelters or protects from danger or calamity; an asylum or retreat; a covert; a stronghold; resource. REF'UGELESS, a. *-lĕs*, without shelter or protection. REFUGEE', n. *-ū-jē'* [F. *réfugié*]: one who seeks safety or shelter in another country from persecution in his own (see below). CITIES OF REFUGE, among the *anc. Jews*, six cities in different parts of Palestine appointed for the retreat and safety of those who killed a person without design.—SYN. of 'refuge': shelter; covert; retreat; asylum; protection; stronghold; sanctuary.

REFUGEE': person who has fled from religious or political persecution in his own country, and taken refuge in another. The term was applied first to those Protestants who found an asylum in Britain and elsewhere at two different periods; first during the Flemish persecutions under the Duke of Alva 1567; afterward 1685, when Louis XIV. of France revoked the Edict of Nantes. Of the numerous French artisans who settled in England on this last occasion, the most part Anglicized their names, as by substituting Young for 'Le Jeune,' Taylor for 'Tellier,' etc., so that their posterity can now hardly be recognized as of foreign origin. According to Lower (*Patronymica Britannica*) De Preux became Deprose, and 'Richard Despair, a poor man,' buried at East Grinstead, was, in the orthography of his forefathers, Despard. There were also refugee families of higher class, some of whose descendants and representatives came to occupy a place in the peerage. The first French revolution brought numerous political refugees to England; and Great Britain and the United States are noted for affording ready asylum to refugees political and religious. Weiss's *History of the French Prot. Refugees, from the Revocation of the Edict of Nantes to the Present Time*, translated by Hardman (London 1854); J. S. Burn's *History of the French, Walloon, Dutch, and other Foreign Prot. Refugees settled in England from the Reign of Henry VIII. to the Revocation of the Edict of Nantes*.

REFULGENT, a. *rē-ful'jent* [L. *refulgens* or *refulgent'em*, reflecting a shining light—from *re*, back; *fulgĕo*, I shine: It. *rifulgente*: Sp. *refulgente*]: reflecting a shining light; casting a bright light; splendid; brilliant; shining. REFUL'GENTLY, ad. *-li*. REFUL'GENCE, n. *-jens*, or REFUL'GENCY, n. *-jĕn-sĭ*, a flood of light; splendor.

REFUND, v. *rē-fund'* [L. *refundĕrĕ*, to restore, to pour back—from *re*, back; *fundo*, I pour: F. *refunder*, to refund, to restore]: to repay; to return, as money in compensation; to restore. REFUND'ER, n. *-er*, one who refunds; in *politics*, one who favors refunding a public debt, or is a member of a party or faction that favors refunding. REFUND'ING, imp. REFUND'ED, pp.

REFURBISH, v. *rē-fûr'bish* [*re*, again, and *furbish*]: to furbish a second time.

REFURNISH, v. *rē-fûr'nish* [*re*, again, and *furnish*]: to supply or provide anew.

REFUSE, v. *rē-fūz* [F. *refuser*, to refuse—perhaps from L. *refūtārī*, to drive back, hence, to refuse; more probably from L. *refundĕrĕ*, to pour back—*refutarĕ* and *refundĕrĕ* are both derived from L. *re*, back; *fundĕrĕ*, to pour: It. *rifusare;* Port. *refusar*, to refuse]: to deny, as a request, an invitation, or a demand; to decline to do or accept; to reject. REFU'SING, imp. REFUSED, pp. *rē-fūzd'*. REFU'SAL, n. *-zăl*, act of refusing; the denial of anything solicited or offered for acceptance; choice of taking or refusing; option. REFU'SER, n. *-zĕr*, one who refuses. REFU'SABLE, a. *-zā-bl*, that may be rejected.—SYN. of 'refuse': to decline; deny; reject; repel; rebuff.

REFUSE, n. *rĕf'ūs* [L. *refūsus*, poured back, rejected—from *re*, back; *fundĕrĕ*, to pour: F. *refus*, refusal, the thing refused]: that which is refused or rejected as useless or worthless; waste matter: ADJ. rejected; worthless; of no value.—SYN. of 'refuse, n.': sediment; dross; trash; dregs; scum; excrement; waste.

REFUTE, v. *rē-fūt'* [F. *réfuter*—from L. *refūtārĕ*, to refute, to repel: It. *rifutare*]: to overthrow or repel by argument or evidence; to prove to be false or erroneous; to disprove. REFU'TING, imp. REFU'TED, pp. REFU'TER, n. *-tĕr*, one who refutes. REFU'TABLE, a. *-tā-bl*, that may be proved false or erroneous. REFU'TABLY, ad. *-blĭ*. REFU'TABIL'ITY, n. *-tā-bĭl'ĭ-tĭ*. REFUTATION, n. *rĕf''ū-tā'shŭn* [F.—L.]: the act of proving to be false or erroneous. REFUTATORY, a. *rē-fū'tā-tŭr-ĭ*, tending to refute.

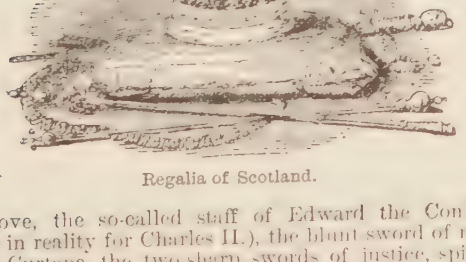
REGAIN, v. *rē-gān* [*re*, back, and *gain:* F. *regagner*, to win back]: to recover; to repossess. REGAIN'ING, imp. REGAINED, pp. *rē-gānd'*.—SYN. of 'regain': to repossess; reobtain; recover; retrieve.

REGAL, a. *rē'găl* [L. *regālis*, kingly—from *rex* or *rēgem*, a king: It. *regale*]: pertaining to a king; kingly; royal. RE'GALLY, ad. *-lĭ*. REGALIA, n. plu. *rē-gā'lĭ-ă* [L. plu. neut. of *rēgālis*, kingly]: ensigns and insignia of royalty (see below): the decorations or insignia of an office or order, as of Freemasons. REGA'LIAN, a. *-lĭ-ăn*, belonging to a king; sovereign. REGALITY, n. *rē-găl'ĭ-tĭ*, sovereignty; royalty: in *Scot.*, formerly a territorial jurisdiction originally conferred by the king, nearly akin to a Palatinate (q.v.) in England. Lands were conferred by the king on some powerful noble, a *Lord of Regality*, to control as he best might with the strong hand, and in the exercise of the highest prerogatives of the crown—often having a complete court of his own, in imitation of royalty. Jurisdictions of R. were abolished in the reign of George II. REGALIA OF THE CHURCH, the privileges which have been granted to the Church of England by the sovereign; the patrimony of the church.

REGALBUTO, *re-gal-bū'tō*, or RAGALBUTO, *rā-gal-bū'tō*: Italian city in the island of Sicily, province of Catania. 30 m. w.n.w. of the city of Catania. It is beautifully situated on a hill near the right bank of the river Salso, with Mt. Etna bounding the prospect on the n.e. Its cathedral is an object of interest. Pop. 9,000.

REGALE, v. *re gāl'*, F. *regaler*, to treat: Sp. *regalar*, to make good cheer, to entertain: It *gala*, good cheer: OF. *galer*, to entertain with sport and glee] to entertain with something that delights the senses in any way; to gratify; to feast or to fare sumptuously. REGALING, imp. REGALED, pp. *re-gāld'*. REGALER, n. *-er*, one who regales. REGALEMENT, n. *re-gāl'ment*, refreshment; entertainment.

REGA'LIA: the ensigns of royalty, particularly the apparatus of a coronation. The R. of England were, prior to the Reformation, in the keeping of the monks of Westminster Abbey, and they are still presented to the sovereign at the coronation by the dean and prebendaries of that church. During the civil war, the crown and most of the regalia fell victims to Puritan zeal; and on the restoration of the royal family, new ensigns had to be made for the coronation of Charles II., which, with occasional alteration and repairs, have continued in use to the present day. The R., strictly so called, consist of the crown, the sceptre, with the cross, the verge or rod with



Regalia of Scotland.

the dove, the so-called staff of Edward the Confessor (made in reality for Charles II.), the blunt sword of mercy called Curtana, the two sharp swords of justice, spiritual and temporal, the ampulla or receptacle for the coronation oil, the anointing spoon (probably the only existing relic of the old R.), the armillæ or bracelets, the spurs of chivalry, and various royal vestments. All these, except the vestments, are now exhibited in the Jewel room in the Tower of London, in which are also a smaller crown, sceptre, and orb for the coronation of a queen consort, two other queen-consorts' sceptres—one of ivory, made for Marie d'Este; and the state-crown of silver and diamonds, used at the coronation of Queen Victoria, containing a large ruby and sapphire, the former said to have been worn by Edward the Black Prince. The Prince of Wales's crown of gold, without stones, is modern.

The proper R. of Scotland consist of the crown, the sceptre, and the sword of state. The crown probably belongs to the time of Robert Bruce, and is adorned with crosses and fleurs de lis alternately. The sceptre is of the time of James V.; the sword was a present from Pope Julius II. to James IV., 1507. During the civil war, the R. were removed by the Earl Marischal for safe custody from the Crown-room of Edinburgh Castle, their usual place of deposit. From the Restoration to the Union, the regalia continued to be kept in the Crown room as formerly. From the time of the consummation of the treaty of Union till 1818, the R. remained locked in a chest in the Crown-room, away from public gaze, and it came to be the general belief that they had been secretly conveyed away to London, an idea confirmed by the keeper of the Jewel-office in the Tower showing a crown alleged to be that of Scotland. In 1818, by warrant under the sign-manual of George IV., then prince-regent, the chest in the Crown-room was broken open, and the crown, sword, and sceptre were found as they had been deposited at the Union; and they are now exhibited in the Crown-room of Edinburgh Castle, with other ancient royal relics of jewels and gold.

REGALIA, *rē-gā'li-a* (or REGALE, *rē-gā'l*). RIGHT OF: right in ecclesiastical things, claimed by sovereigns in virtue of the royal prerogative, which has frequently been the subject of angry controversy between kings and popes. It involved several points as to presentation to benefices; but the most serious conflicts arose out of the abusive claim by the crown to the revenues of vacant benefices, especially bishopries, and the co-ordinate claim to keep the benefice or the see vacant for an indefinite period, in order to appropriate its revenue: see INVESTITURE. Most memorable of these conflicts was that of Innocent XI. (q.v.) and his successor with Louis XIV.—Louis XIV. having gone so far as to seize the papal territory of Avignon in reprisal.

RE'GALS [perhaps from *rigabello,* instrument used prior to the organ in the churches of Italy]: small portable finger organ in use in the 16th and 17th c., and perhaps earlier.

Regal.

REGARD, v. *rĕ-gârd'* [F. *regarder;* It. *riguardare,* to look upon, to see (see GUARD)]: to notice with particular attention; to look toward; to observe; to remark; to attend to with respect; to fix the mind on, as a matter of importance; to pay attention to; to respect; to esteem: N. attention of mind from a feeling of interest; attention as a matter of importance; notice; heed; respect; esteem; relation; reference; look; view; aspect directed to another; in *OE.,* prospect; object of sight. REGARD'ING, imp. REGARD'ED, pp. REGARD'ER, n. *-er,* one who regards;

in *law*, an officer whose business was to inspect the forests, the inferior officers, etc. REGARD ANT, a. *-ant* [F.]: in *her.*, looking behind or with head turned backward (see PASSANT: RAMPANT): in *feudal law*, annexed to the manor or land. REGARD FUL, a. *-fool*, attentive, taking notice. REGARD FULLY, ad. *-li*. REGARD LESS, a. *-les*, unobservant; heedless, inattentive. REGARD LESSLY, ad. *-li*, without heed. REGARD LESSNESS, n. *-nes*, the state or quality of being regardless; heedlessness. REGARDS, n. plu *-gardz'*, respects; good wishes.—SYN. of 'regard, v.': to attend to; value; estimate; remark; observe; consider; respect; heed; mind; esteem; —of 'regard, n.': attention; reverence; respect; note, eminence; account; esteem; relation; reference; look; aspect, consideration; notice; observance; heed; care; concern; estimation; attachment; —of 'regardless': careless; indifferent; inattentive; unobservant; neglectful; negligent; unconcerned.

REGATHER, v. *re-gith'er* [*re*, again, and *gather*]: to collect a second time.

REGATTA, n. *re-gat'ta* [It *regatta*, annual boat-race of gondoliers at Venice; O It. *rigattare*, to strive for the victory: Sp. *regatear*, to rival in sailing: F. *régate*]: sailing or rowing match in which a number of boats and yachts contend for prizes. REGATTAS, n. *-taz*, a thick, strong cotton fabric, having narrow stripes of white and dark blue.

REGEAL, v. *re-jel* [L. *re*, again; *gelu*, frost]: to freeze again. REGEALING, imp. REGEALED, *re-jeld'*. REGELATION, n. *rej'el-a'shun*, the act of freezing again (see below).

REGELATION, ill-chosen term for a somewhat obscure phenomenon, inasmuch as it implies a previous state which may not have existed. The term however has come into general use. The principal fact to be explained is the adhesion of two pieces of ice brought into contact, not merely in air, but even when both are immersed in water at such temperatures as 100° F. Several explanations have been proposed, of which specially notable are those of Faraday, Forbes, and J. Thomson.

Faraday's idea seemed to be that in liquid and solid bodies the proximity of particles in a particular state tends to produce the same state in other particles; and thus, that a film of water between two plates of ice tends to assume the solid state. There are many singular phenomena in physical science apparently explicable by this suggestion; yet this 'explanation' seems merely to *shift* the difficulty, without overcoming it.

Forbes starts with the assumption that ice is essentially colder than water, therefore that there is constantly a transfer of heat from water to ice which is in contact with it; the effect being to cover the surface of the ice with a film of half-melted ice or half-frozen water. Such a film, between two slabs of ice, would part with heat to both, and would freeze without melting the adjacent ice. This explanation would be satisfactory if the postulate could be granted, but it is deemed improbable that there is any

such essential difference of temperature between solid and liquid water,

The explanation proposed by Prof. J. Thomson is undoubtedly founded on a *vera causa*, and certainly accounts for at least a part of the phenomena; yet there may be hesitation in allowing that the cause is adequate to the observed effect in every case. Prof. Thomson's explanation is founded on his beautiful theoretical discovery that *the freezing-point of water is lowered by pressure*, which was experimentally verified by W. Thomson. Hence, if two slabs of ice be pressed together, at the points of greatest pressure the ice will be melted; its latent heat of fusion must be drawn from surrounding bodies, and thus cold is produced which will freeze part of the film of water between the two slabs. The points of greatest pressure will thus be shifted, and the process of melting and regelation may go on indefinitely. Objections to this explanation were advanced by Faraday and Forbes, who showed that slabs of ice freeze together when suspended vertically with the view of avoiding pressure between them. But J. Thomson shows that the capillary forces of the film of water which must (in these cases) be between the slabs (for without directly applied pressure the effect cannot be obtained with slabs of *dry* ice), are sufficient to produce the pressure requisite for his mode of explanation. While this part of the subject cannot be said to be completely cleared up, the theory of J. Thomson has been applied with perfect success in explanation of the extraordinary phenomena observed in Glaciers (q.v.), where enormous forces are constantly at work. It evidently at once accounts for the result of observation, due to Rendu and Forbes, that a glacier moves like a viscous fluid: in fact, it shows why and how the mass gives way to pressure, and how it is refrozen in a new form, which in turn gives way to the new distribution of pressure. The explanation of the veined structure, the formation of clear ice from snow, etc., all are easily deduced from it.

The phenomena of R. are easily seen in the making of snow-balls, which is known to be impossible, by the hands at least, when the snow has been exposed to great cold, and is therefore dry. But, even in this case, the effect is easily obtained by application of pressure sufficient to melt the ice, as is seen in wheel-tracks, etc. By means of a Bramah's press, it is easy to convert a snowball into a sphere of clear ice.

REGENCY: see under REGENT.

REGENERATE, v. *rē-jĕn'ēr-āt* [L. *regenĕrātus*, reproduced—from *re*, again; *generāre*, to beget—from *genus*, origin: It. *rigenerare*: F. *régénérer*]: to produce anew; to form into a new and better state; to change the heart from evil to good, to cause to be spiritually born: ADJ. reproduced; born again; changed in heart. REGEN'ERATING, imp. REGEN'ERATED, pp.: ADJ. renewed, as by grace; born again. REGEN'ERATENESS, n. *-nĕs*, the state of being regenerated. REGEN'ERA'TION, n. *-ā'shŭn* [F.—L]: by some understood as the change of nature produced in the heart of man through the working of the Holy Spirit, significantly called 'a being born again' (see below): in *physiol.*, renewal of a portion of lost or removed tissue. REGENERATIVE, a. *-ā-tĭv*, pertaining to regeneration. REGEN'ERA'TOR, n. *-ā'tŏr*, one who regenerates. REGENERATOR FURNACE (see GLASS). REGEN'ERA'TORY, a. *-ā'tŏr-ĭ*, tending to reproduce or renovate. *Note.*—REGENERATION in modern times is loosely applied to 'conversion'; but in the Book of Common Prayer, and in OE., it simply denotes 'the new birth, or entrance into a state of grace.'

REGENERATION: theological term denoting the spiritual change which passes on all men who become Christian disciples. There are various interpretations of the mode and meaning of this change, but its necessity in one form or another may be said to be admitted by all branches of the Christian Church. By all, man is supposed, as the condition of his becoming truly Christian, to pass from a state of nature to the regenerate state, from a state in which he obeys the mere impulses of the natural life to a state in which a new and higher—a divine—life has been awakened in him. The words of Christ to Nicodemus: 'Verily, verily, I say unto thee, except a man be born again, he cannot see the kingdom of God,' are accepted by the Christian Church as the expression of this universal necessity. Further, every branch of the general church recognizes, though under very different conditions, the Holy Spirit as the author of this change. The change, in its real character, is spiritual, and spiritually induced. According to certain sections of the Christian Church, however, the change is inseparably involved with Christian baptism in all cases; while other sections do not acknowledge any essential connection between baptism and regeneration. In the view of the former, baptism constitutes always a real point of transition from the natural to the spiritual life. The grace of baptism is the grace of R.: the laver of baptism is the laver of R., not merely in any formal sense, but in a real and living sense; so that every baptized person—at least every rightly baptized person—has already become a Christian truly, though he may fall away from the grace that he has received. This is what is commonly called the High Church doctrine of R.; but its strong statements evidently admit different shades of meaning in different minds, and are not to be regarded as necessarily signifying—though they may permit—the belief that baptism is itself a spiritual regeneration, nor the

belief that baptism itself works such regeneration. In the view of others, R. is a special, conscious process, which takes place independently of baptism, or of any other outward fact or ceremony. It implies a sensible experience—an awakening whereby men come to see the evil of their sin, and the divine displeasure against sin, and, through the Holy Spirit, are born again, put away their former evil life, and begin to live a new divine life; and many Christians have spoken with rapture of this *experience*, of its thoroughness, its suddenness, its immediateness. There are different shades of opinion on the subject; some (certainly without warrant from Scripture or from the known laws of mental operation) holding it as a condition of R. that the regenerate should be able to recount, or at least give some precise idea of the time and manner of the change through which they have passed; others repudiating such views as savoring of fanaticism, yet holding no less to the spiritual definiteness of the change, independently of church forms of any kind; and such views, in contradistinction to the High Church doctrine, have received the quite inapplicable name Evangelical.—From the above outline, it is evident that some modern theology has used the term R. loosely as the same with conversion. Though the two may practically blend, R. strictly denotes the act of God in conversion, while conversion denotes the act of man under regeneration.

REGENSBURG, *rā ghĕns-bûrch*, or RATISBON, *rāt'ĭs-bon* (Lat. *Reginum Radespona*): city, capital of a Bavarian province; on the right bank of the Danube, 65 m. n.n.e. of Munich. R., formerly a free city of the empire and seat of the diet, is in a broad and fruitful valley, 1,000 ft. above sea-level. It presents a distinctly mediæval aspect, with its ancient ramparts, fosses, and gates, and its narrow crooked streets with their high, many-cornered, gabled houses; while it retains many interesting monuments of its importance and wealth during the middle ages. Among its 13 Rom. Cath. churches, the most remarkable is the cathedral, begun 1275, and not completed till the middle of the 17th c., which ranks, since its restoration 1830–38, as one of the noblest specimens of German architecture, and is especially noteworthy for the fine monuments of its former bishops, and for its silver altar and numerous painted-glass windows, restored 1830. The Scottish Church of St. James (secularized 1862) dates from the 12th c., and is the pure Byzantine style. There are several monasteries, and three Prot. churches. The old town-hall was used for a century and a half as the place of meeting for the imperial diet. The royal library contains 60,000 vols. The city has several highly ornamental fountains, and contains a monument to Kepler, the astronomer, who died in R. A stone bridge connects R. with the busy trading suburb Stadt am Hof. The manufactures of R. include gold, silver, brass, and steel wares, paper, earthenware, beet-root sugar, brandy, and superior candles and soap. Since 1853 it has been a free port; and in addition to ship-building actively carried on, the trading community is

engaged in transport of corn, wood, and salt. R., as the principal seat of the Danube Steam-navigation Company, is a busy trading port.

R., which ranks as one of the most ancient cities of Germany, and was built by the Romans, by whom it was named *Regivum*, was a place of commercial importance in the early ages of Christianity. In 750, a bishopric was founded here, comprising a large portion of Bavaria and the Upper Palatinate. Under Emperor Frederick I., it was relieved from its subjection to the dukes of Bavaria, and declared a free city. During the middle ages it was the chief seat of the Indo-Levantine trade, and one of the wealthiest and most populous cities of s. Germany. From 1663 to the dissolution of the German empire 1806, R. was, with a very short interregnum, the seat of the German diet, and after various changes of fortune during the period of Napoleon's power, was finally ceded to Bavaria, of which it has since formed an integral part. Pop. (1880) 34,516; (1890) 37,365.

REGENT, n. *rē'jent* [F. *régent*—from L. *regens* or *regen'tem*, ruling, governing—from *rego*, I rule: It. *reggente*; Sp. *regente*, a regent]: one who governs during the absence, incapacity, or minority of a sovereign (see below): a governor: *Adj.* exercising vicarious authority. REGENTSHIP, n. the office or dignity of a regent. REGENCY, n. *rē'jen-si*, the office or jurisdiction of a regent; the collective body intrusted with vicarious government; the district governed by a vicegerent.

REGENT: one who exercises the power without having the name of a king. In a hereditary monarchy, various circumstances may necessitate the delegation of the sovereign power—e.g., devolution of the crown on a minor too young to be intrusted with the kingly office, incapacity of the sovereign by illness, mental or bodily; and absence of the sovereign from his realm. A R. under the title Protector (q.v.) has often been appointed to exercise royal authority in the sovereign's minority, the latest instance in England being during the minority of Edward VI.; and regents and councils of regency have been sometimes named by the sovereign to provide for the probable nonage of his heir. In 1788, when George III. became incapacitated by insanity, the chief political authorities were divided on the question whether his eldest son then of full age had a right to be R., or whether the nomination rested with parliament: the king's recovery ended the discussion. On the return of the malady, the regency was conferred on the Prince of Wales by parliament. During Queen Victoria's various short absences from the country, there has been no delegation of the royal power.

REGENT OF A UNIVERSITY: term variously applied.—In the Univ. of Paris, where this as well as other learned distinctions originated, every master of arts had the privilege, and the duty, of delivering public lectures. The same was the case at first in the universities of Oxford and Cambridge. About the middle of the 13th c. the title Master became a degree attainable by any one on certain conditions of residence and proficiency; and the duty of lecturing was confined to a limited number of graduates, called *Regents*, who were eventually succeeded in the office of lecturing by the established professors. In the English universities, a master of arts become a R after a short period, and is supposed to read lectures during the year of his regency. The regents still form the governing body in the Convocation and Congregation at Oxford, and in the Senate of Cambridge. In Scottish universities, according to their early constitution, the regents were the lecturers; and celibacy was enforced on them till about the middle of the 17th century.

In the United States in some universities a R. is practically the same as president, though in theory acting vicariously for some governing body; in some others, R. denotes a member of a governing board or council; but the term is not in general use.

REGERMINATE, v. *rē-jėr'mi-nāt* [*re*, again, and *germinate*]: to germinate anew. REGER MINA TION, n. act of sprouting or germinating again.

REGGELLO, *rėd-jėl'lo:* small town of Italy, province of Florence, 16 m. e.s.e. of the city of Florence. It is surrounded by beautiful hills, which produce wines, fruits, and grain in abundance. Pop. 10,700.

REGGIO, or REGGIO DI CALABRIA, *rėd'jo dē kā-lā'brē ā* (anc. *Rhegium Julii*): seaport in s. Italy, chief city of the province of R. (formerly Calabria Ultra I.); on the shore of the Strait of Messina, 10 m. s.e. of the city of Messina in Sicily. It is well built; its streets are wide and regular, and it is surrounded by a wall flanked by towers. A fine cathedral, a hospital, and several educational institutions are the principal buildings. There are manufactures of linens, stockings, silks, and odoriferous waters. The fisheries of the vicinity are profitable, and abound in the Pinna (q.v.), a mollusk, whose very delicate skin is made into gloves, stockings, and caps of great value. The climate of R. is salubrious, and the scenery of the vicinity exceedingly beautiful; the soil is rich, and produces fruit-bearing plants, of the temperate and tropical zones, in great variety. Behind the city rises Aspromonte, a mountain of the Apennines, where Garibaldi was wounded and taken prisoner 1862.—Pop. (1881) town and suburbs 35,437; commune (1894) 56,700.

The anc. *Rhegium* was founded by the Greeks, was governed wisely and justly by Anaxilas, and afterward by his sons B.C. 494–461. It was besieged and destroyed by Dionysius the Elder, rebuilt by Dionysius the Younger, and afterward united to Rome.

REGGIO, or REGGIO NELL' EMILIA, *rĕd-jō nĕl lā-mēl'ē-ä:* city of central Italy, formerly belonging to the duchy of Modena, now included in the province of Modena; on the ancient *Via Emilia*, 16 m. w.n.w. of the city of Modena. R. is on a fertile plain on the right bank of the Crostolo; is surrounded by a wall; contains beautiful palaces, and a fine cathedral of the 15th c. and other churches, which possess famous paintings, the *Teatro Nuovo*, one of the finest theatres in Italy, the lunatic asylum; a museum, an acad., and many other institutions. It is a rich city; and has manufactures of cotton, of cloth, and of other stuffs. Pop. (1881) 18,634.

REGIAM MAJESTATEM, *rē'jī-ăm măj-ĕs-tā'tĕm:* ancient collection of laws compiled (as it asserts) by order of David I., King of Scotland. Its authenticity has been controverted; the prevalent opinion being that it is a compilation from the English work of Glanville, called the *Regiam Potestatem*, and that the publication of the book was an artifice of Edward I. to further his design of assimilating the Scotch law to that of England.

REGICIDE, n. *rĕj'ī-sīd* [F. *régicide;* It. *regicida*, a regicide—from L. *rex* or *regem*, a king; *cædo*, I kill]: one who murders a king or sovereign; the murder of a king. REG'ICI'DAL, a. *-sī'dăl*, pertaining to a regicide, or to regicide.

REGILD, v. *rē-gĭld'* [*re*, again, and *gild*]: to gild anew.

REGILLUS, *rē-jĭl'lŭs*, LAKE: anciently a small lake of Latium, s.e. of Rome, probably in the extinct volcanic crater of Cornufelle, near the modern Frascati, which was drained in the 17th c. Lake R. is celebrated in the semi-legendary history of Rome as the scene B.C. 496 of a great battle between the Romans, under Aulus Postumius, and the Latins on behalf of the banished Tarquin, under O. Manilius. The latter were entirely defeated.

REGIME, n. *rā-zhēm'* [F. *régime* -from L. *regimen*, a governing]. mode of living; form of government; rule; administration.

REGIMEN, n. *rĕj'ī-mĕn* [L. *regimen*, direction—from *rego*, I rule: F. *régime*]: in *med.*, regulation of diet and habit; régime; in *gram.*, the regulation of one word by another; the words regulated.

REGIMENT, n. *rĕj'ī-mĕnt* [F. *régiment* -from mid. L. *regimentum:* L. *regimen*, a guiding or directing—from *rego*, I rule: It. *reggimento*, a regiment]: body of soldiers, consisting of a number of companies if infantry, and of squadrons if cavalry, under command of an officer called a colonel (see below): V. to form into regiments. REGIMENTAL, a. *rĕj'ī-mĕnt'ăl*, of or relating to a regt. REG'IMENT'ALS, n. plu. *-ălz*, all the articles of military dress. REGIMENTAL COLOR, the left-hand color of the pair of colors of an infantry regt. REGIMENTAL SCHOOLS, schools maintained by govt. for soldiers of a regiment, and their older children.

REGIMENT: in all modern armies, a body of soldiers under a colonel's command, and the largest *permanent* association of soldiers. Regiments may be combined into brigades, brigades into divisions, and divisions into armies; but these combinations are temporary, while in the R. the same officers serve continually, and in command of the same body of men. The strength of a R. may vary greatly even in the same army, as each may comprise any number of battalions.

The regimental system could exist only where standing armies are maintained. Accordingly, the Macedonian syntagmata and the Roman cohorts were evidently regiments in a strict sense. During the middle ages, feudal organization precluded the system, and its first reappearance was in France. Francis I. formed legions of 6,000 men each, which were divided into independent companies, the latter being, in fact, battalions, and each legion a regiment. The word R. began to be applied to bodies of British troops in Elizabeth's reign; regiments are spoken of at the time of the Armada 1588, and as composing the force in Ireland 1598. From that time forward, the army and militia of Britain have been organized into regiments. The 110 regiments of the line have recently been reorganized as 71 regiments of linked battalions (see WAR SERVICES). Each is nominally commanded by a col., who is an old general officer, and whose office is merely a sinecure. The real command rests with the lieut.-col. in each battalion, who is assisted by a major, and has for a staff an adjutant, a quartermaster, a paymaster, and a surgeon. The R. or battalion is divided into companies in infantry, engineers, and army service corps; into troops in the cavalry. The artillery is divided into 30 brigades, each of which is as large as an ordinary R. The brigade is sub-divided into batteries, which are the working units. The working officers are capt. and 2 lieuts. to each infantry company or cavalry troop; major, capt., three lieuts. per battery of artillery. See UNIFORM.

The U. S. army 1896 was classified as follows: inf., cav., artil., and miscellaneous, the latter comprising the engineer battalion, ordnance dept., signal service, hospital service, Indian scouts, the force at the Milit. Acad., recruiting service, etc. The inf. arm had 25 regiments, 877 officers, and 12,925 enlisted men (13,802); the cav., 10 regiments, 432 officers, and 6,050 men (6,482); the artil., 5 regiments, 280 officers, and 3,975 men (4,255); and the miscellaneous service, 556 officers, and 2,862 men (3,418), a total of 2,145 officers, and 25,812 men (27,957). In the distribution of the army in time of peace it is seldom that more than 5 companies of any arm are stationed at one place. In an emergency in which state troops cannot be called out or are insufficient, there may be a swift mobilization of many companies. An inf. R. comprises about 500 men in peace and 1,000 in war; a cav., 12 troops of 63 officers and men; and an artil., 12 batteries of 68 officers and men again, an inf. R. has 10 companies; a cav., 12; and an artil. 12. Every R. has a col. and a lieut.col.; an inf. R. has

one maj., and a cav. and artil. R. 3 majors each. Parts of all the regiments were distributed 1896 among 8 milit. depts., 88 posts, and 22 armories, arsenals, and rendezvous.

REGIOMONTANUS, *rē-jē-ō-mon-tā'nus:* name adopted by an early German mathematician originally named Johann Müller—but who called himself at first Johnde Monteregio, and afterward Regiomontanus, probably because he was a native of Königsberg (of which *R.* seems intended as a Latin equivalent): 1436, June 6—1476, July 6. Of which Königsberg he was a native is disputed among his biographers, but Delambre and others favor the one in Franconia. R. was sent by his parents to Leipzig at the age of 12, and there made such extraordinary progress in mathematical studies, that by the time he was 16, he could find nobody, it is said, in the Saxon University competent to give him further instructions. He therefore removed to Vienna, where 1461 he became prof. of astronomy, but was permitted to reside in Italy for some time to study Greek, with the view to studying the writings of the Alexandrian geometricians and astronomers. He appears to have gone through great labor in collection, collation, and copying of Greek MSS., in studying the language under the best masters, such as Theodore Gaza, making astronomical observations, lecturing to the students of Padua on the Arabian philosopher Alfragan, and composing his famous work, *De Triangulis Planis et Sphæricis* (published Nürnberg 57 years after his death), which, according to Delambre, comprises what was known of plane and spherical trigonometry. In 1464 R. returned to Vienna and to his duties as professor; but afterward removed to Buda, in Hungary, on invitation of Mathias Corvinus. In 1471 he went to Nürnberg, where he lived in intimacy with a wealthy and enlightened citizen, Bernhard Walther, who furnished means to start a book-printing establishment, and to construct various astronomical instruments by which they were enabled to demonstrate the inaccuracies of the 'Alphonsine Tables.' R. then engaged in composition of scientific works, among others *Kalendarium Novum* (before 1475), regarded as the first almanac in Europe. This work excited great attention among the learned and powerful of the time, and the first ed. was rapidly sold. The king of Hungary presented R. with 800 or 1,200 golden crowns; and Pope Sixtus IV sought his assistance in his reformation of the calendar; and to secure his services appointed him Abp of Ratisbon. R. went to Rome, but soon died there at the early age of 40. He had great ardor and sagacity, and is pronounced by competent authorities the most learned astronomer of his age. For list of his writings, see *Biographie Universelle.*

REGION, n. *rē'jun* [F. *région;* L. *regiōnem,* a boundary-line, a territory—from *rego,* I rule: It. *regione*]: a portion or space of territory of indefinite extent; a country; a district; a tract of space; any large tract of sea or land characterized by some features not found in other areas or parts; in *anat.,* a part or division of the body; in *OE.,* dignity; rank; the heavens.

REGISTER, n. *rĕj'is-tẽr* [F. *registre;* It. and Sp. *registro,* a register—from mid. L. *reg'istrum, reg'istra,* for L. *regesta,* notes of things thrown together in a memorandum—from L. *re,* back; *gesta,* things carried—from *gero,* I carry]: written account, or entries in a book, of acts or proceedings for preservation and for reference; a record; the book in which the record is kept: that which regulates or adjusts: written document issued to captains of foreign-bound vessels as evidence of nationality: in *printing,* regulation of the forms, by which the lines of pages on one side of a sheet are printed exactly on the back of those on the other side: one of the inner parts of the mold in which printing-types are cast: the compass of a voice or instrument (see REGISTER OF VOICE): in an *organ,* a sliding piece of wood perforated with a number of holes for regulating the admission of wind into the pipes; sometimes, the sets of pipes or stops of an organ: a stopper or sliding plate for regulating the heat of a fire: V. to enter or cause to be entered in the record-book; to enroll. REG'ISTERING, imp. REGISTERED, pp. *-tẽrd:* ADJ. recorded; enrolled. REG'ISTRY, n. *-trĭ,* act of registering; place where a register is kept; a series of facts recorded. REGISTER GRATE OR STOVE, grate or stove furnished with an apparatus to regulate the heat. REGISTERING PYROMETER, instrument for measuring high temperatures by the expansion of bars of metal. REGISTERING THERMOMETER, one which records its own indications. PARISH REGISTER, book for recording the baptisms, marriages, and burials of a parish. REGISTERED COMPANY, assoc. not possessing a charter, but only registered under a Joint Stock Act. REGISTERED LETTER, a letter or parcel on which a special fee has been paid for ensuring safe delivery. REGISTER OFFICE, a record office; in *Scot.,* large building in Edinburgh set apart for safe custody of the national archives, and for recording of titles and burdens connected with real estate. LORD CLERK REGISTER, Scottish officer of state who has custody of the national archives. REG'ISTRAR, n. *-trär* [mid. L. *regis-trārĭŭs*]: one whose business it is to write or keep a register, as one of births, deaths, and marriages. REG ISTRARSHIP, n. office of a registrar. REG ISTRA'TION, n. *-trā'shŭn,* act of inserting into a register.—SYN. of 'register, n.': catalogue; roll; list; record; annals; archives; chronicle.

REG'ISTER OF VOICE: term denoting the different kinds of sound distinguishable in the graduated scale of notes produced by any individual voice. Those sounds which, like the ordinary sounds of speech, proceed naturally and freely from the vocal organs, constitute the *chest voice.* By a strained contraction of the glottis, notes may be produced of higher pitch than those of the chest voice; these are called *falsetto* or *head voice,* and have a peculiar flute or flageolet-like quality. Though often sweet and exceedingly pleasing, they cannot be used long without some amount of constraint or effort; and they are never so powerful, so open, nor so impressive as the chest voice. The lower notes, and, in most voices, by far the greater number of notes, belong to the chest voice, the falsetto being em-

ployed only in the higher and highest sounds. The sounds produced by the head voice are called the *upper register*, those produced by the chest voice the *lower register*, of the voice; and such notes of the chest voice as may be produced also by the falsetto are said to belong to the *middle register*. In a properly trained voice, the falsetto is so blended with the chest voice without perceptible break.

REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES: official enrolment under law of the most important facts connected with the population of the country and its social progress. In England, the first act for this purpose was passed 1836, and a general registry-office was provided in London (at Somerset House) for England and Wales. But there had long been an ecclesiastical R. of marriages, baptisms, and burials in connection with each parish church, the officiating minister being required (and being still required) to keep such a register. These registers are transmitted annually to the registrar of the diocese, who keeps the same, and allows inspection on payment of certain fees. The head of the registration office at Somerset House is the registrar-general; and many of the older registers also have been collected and put under his care. Indexes are kept; and every person is entitled, on payment of a fee, to search them and to have a certified copy.

In the United States the earliest records of vital statistics were those kept by church or parish clerks, and in the absence of other records these were admitted as evidence in courts of law. But with increase in population and multiplication of churches, these records proved inadequate for public purposes. They did not relate to the whole body of a community or state, they were too scattered for general or particular reference, and they were not based on any legal obligation that would guarantee regularity and accuracy. The first thorough, systematic collections of vital statistics were made by the large life-insurance companies for their own business purposes. The public R., under strict laws carrying penalties for evasions, is a matter of comparatively recent general legislation, and is now either a function of state and city boards of health, or state and city bureaus of vital statistics. Physicians are obliged to report to the registrars all births, with dates, names of children, and names of parents, within a specified number of days; and all deaths, with dates, causes, records of attendance, etc. Clergymen are similarly obliged to report all marriages solemnized by them, with dates, names, and ages of both parties, names of parents of both parties, and of witnesses. In many states no undertaker is allowed to make an interment before receiving a certificate of the death, from either the physician in attendance or the registrar. In cases of sudden death, by accident, in public highways, etc., or at home when no physician was in attendance, nothing can be done toward burial till a coroner, co. physician, city physician, or other officer charged with the duty, has ascertained the cause of death. These officers are authorized to grant certificates of death and permits to bury, but must report the same as unofficial physicians.

REGIUS, a. *rē'ji-ŭs* [L. *regius*, kingly—from *rex* or *rēgem*, a king]: founded or appointed by a king, applied to certain professorships. Regius professors in the Eng. universities are those whose chairs were founded by Henry VIII.; in the Scotch universities, those the patronage of whose chairs is vested in the crown. REGIUM DONUM, *rē'ji-ŭm do'nŭm* [L., royal grant]: annual grant of public money formerly paid by the legislature in aid of the incomes of the Presb. ministers in Ireland in recognition of their loyalty to the crown in certain troublous times; occasionally shared also by Baptists and Congregationalists till voluntarily renounced by them 1857—first granted 1672, abolished 1869. Its total amount (1792) was £5,000; (1863) £39,746.

REGLET, n. *rĕg'lĕt* [L. *regŭla*, a straight-edged ruler—from *rego*, I rule: F. *réglet*, a rule]: in *arch.*, a flat narrow molding rising equally on both sides, used to separate panels, etc., or to form ornaments, as frets or knots; among *printers*, reglets are strips of wood of various thicknesses.

REGMA, n. *rĕg'mă* [Gr. *rhēgma*, a rupture—from *rhēgnumi*, I break]: in *bot.*, a seed-vessel, composed of small dehiscent compartments, called *cocci*, as in *Euphorbia* and *Geranium*.

REGNANT, a. *rĕg'nănt* [L. *regnans* or *regnan'tem*, ruling or reigning; *regnum*, dominion, rule—from *rego*, I rule: F. *régnant*: It. *regnante*]: exercizing regal authority; ruling; predominant; prevalent. QUEEN-REGNANT, a queen who exercises regal authority by hereditary right, in distinction from a *queen-consort*. REGNANCY, n. *rĕg'năn-sĭ*, the condition or quality of being regnant. REGNAL, a. *rĕg'năl*, pertaining to the years a sovereign has reigned.

REGNARD, *rĕh-nâr'*, JEAN FRANÇOIS: comic dramatist: 1655, Feb.—1709, Sep. 4; b. Paris. He received a good education, and at his father's death was heir, at the age of 20, to a considerable fortune. R. then set out for Italy to see its works of art and its monuments of antiquity: but so far from squandering his estate, he increased it largely by his luck and skill in gambling. In Italy he fell in love with a young matron of Provençal origin; and, as the story goes, was on board an Eng. frigate in company with her and her husband, *en route* for France, when the vessel was captured by Algerine pirates. R., the lady, and her husband were sold for slaves in Constantinople. The husband disappeared from the scene within 2 years, and R. and the lady were then ransomed for 12,000 livres. The pair were about to be married when the husband reappeared and claimed his wife. R., disappointed, became a rover, journeying through n. Europe, also Poland, Hungary, and Turkey. He returned to Paris 1683. He bought the place of state treasurer of the Paris dist.; he bought a city house and a country villa; he became a man of fashon, a *bon-vivant*, and a writer of comedies. His first comedy, *Le Divorce*, was performed at the Théâtre Italien 1688, and was followed by a number of small pieces. He produced his *Attendez-moi sous l'Orme*, 1694, at the Théâtre Français;

and his great comedy, *Le Joueur*, 1696. His dramatic compositions number 25, among them, besides those above named, are *Le Distrait* (1697), *Le Retour Imprévu* (1700), *Les Folies Amoureuses* (1704), *Les Menechmes* (after Plautus) (1705), and his masterpiece, *Le Légataire Universel* (1708).

REGNAULT, *rĕh-nō'*, HENRI VICTOR: French chemist and physicist: 1811, July 21—1878, Jan. 19; b. Aix-la-Chapelle. While still very young, he was left to provide for himself and his sister, came to Paris, and became a shopman in a bazaar. He made such good use of his scanty leisure, that he qualified himself for admission 1830 to the École Polytechnique, and, after the two years' course, came out as a mining engineer. He became a prof. in Lyon, whence, 1840, he was recalled to Paris as a member of the Acad. of Sciences, in consequence of some important discoveries in organic chemistry: he had, since 1835, been prosecuting researches on the haloid and other derivatives of unsaturated hydrocarbons. Having filled chairs in the École Polytechnique and the Collège de France, he became 1854 director of the imperial porcelain manufactory at Sèvres.

He was distinguished for extreme skill and patience in experimental work, more than for brilliance or novelty in discovery; and applied himself especially to determination of important physical data, such as the laws of expansion of gases, measurement of temperature, latent and specific heats, etc. His greatest practical work is that on the numerical data bearing on the working of steam-engines, for which the Royal Soc. of London awarded him their Rumford medal. He received also the Copley medal (1869) of the Royal Soc., and was one of its foreign members. In addition to numerous papers in *Annales de Chimie*, etc., he published *Cours Élémentaire de Chimie* (4 vols. 14th ed. 1874). —His son HENRI R (1843-71), painter of some brilliant works, was killed in the Franco-German war.

REGNIER *rĕh-ne-ā'*, MATHURIN: father of French classic satire: 1573, Dec. 1—1613, Oct. 22; b. Chartres. Entering the priesthood, he was appointed canon of the Cathedral of Chartres, and was generously befriended by Card. de Joyeuse and the French ambassador at Rome, Philippe de Béthune. His 16 *Satires* are after the manner of Juvenal, but give proof of abundant native wit and acute observation. He composed also *Epistles*, *Elegies*, and some minor poems. A critical ed. of his complete works was pub. by Viollet-le-Duc 1822.

REGORGE, v. *rē-gōrj'* [*re*, again, and *gorge*]: to swallow again; to eject from the stomach; to vomit up.

REGRAFT, v. *rē-grăft'* [*re*, again, and *graft*]: to graft anew.

REGRANT, v. *rē-grănt'* [*re*, back, and *grant*]: to grant back.

REGRATE, v. *rē-grāt'* [F. *regrat*, sale of salt by retail; *regratter*, to exercise the trade of a broker, to bargain, to scrape again—from *re*, again; *gratter*, to scratch: comp. Sp. *regatero*, a haggler, a huckster: It. *rigattare*, to wrangle]: to buy and sell again any wares or victuals in the

same market, or within five miles thereof: to renovate old hewn stone by removing the outer surface. REGRA'TING, imp.: N. forestalling the market (see ENGROSSING: MONOPOLY): removing the surface of old hewn stone. REGRA'TED, pp. REGRA'TOR, n. *-tĕr*, one who regrates; a huckster.

REGREDE, v. *rē-grēd'* [L. *regredi*, to go back, walk back]: to retrograde; to go back: said of one of the movements of a planet's apsis under the action of a disturbing force: see PERTURBATIONS.

REGREET, v. *re-grēt'* [*re*, and *greet*]: to greet or salute a second time: N. a return or exchange of salutation.

REGRESS, n. *re'grĕs* [L. *regressus*, a going back—from *re*, back; *gressus*, a stepping—from *gradior*, I step: F. *regrès*: It. *regresso*]: passage back; power of returning: V. *rē-grĕs'*, to go back or backward; to return. REGRES'SING, imp. REGRESSED, pp. *re-grest'*. REGRES'SIVE, a. *-grĕs'sĭv*, passing back; returning. REGRES'SIVELY, ad. *-lĭ*. REGRES'SION, n. *-grĕsh'ŭn*, the act of passing back or returning.

REGRET, n. *rē-grĕt'* [F. *regretter*, to lament: Goth. *gretan*, to weep: Icel. *gratr*, weeping: Scot. *greet*, to cry]: a slight degree of grief or sorrow arising from some occurrence of the past; pain of conscience for some fault; slight remorse: V. to remember with pain of mind; to grieve at; to be sorry for; to repent. REGRET'TING, imp. REGRET'TED, pp. REGRET'LESS, a. *-lĕs*, without regret. REGRET'FUL, a. *-fŭl*, full of regret. REGRET'FULLY, ad. *-lĭ*. REGRET'TABLE, a. *-ă-bl*, admitting of or deserving regret.—SYN. of 'regret, n.': concern; sorrow; grief; penitence; remorse; self-condemnation; lamentation; repentance.

REGUERDON, n. *rē-gĕr'dŭn* [*re*, and *guerdon*]: in *OE.*, reward; recompense: V. to reward.

REGULA, *rĕg'ū la:* band under a Triglyph (q.v.) in the Doric style, or the bands between the canals of the triglyphs.

REGULAR, a. *rĕg'ū-lĕr* [L. *regŭlāris*, of or pertaining to a straight edged ruler or bar of wood—from *regŭla*, a rule—from *rego*, I rule: It. *regolare*, regular, exact: F. *régulier*, regular]: according to rule, order, or established practice; in accordance with the ordinary form or course of things; consistent; governed by rules; uniform in practice; pursued with uniformity or steadiness; straight; level; having the parts all symmetrical; in *bot.*, applied to a flower, the parts of which are of similar form and size: N. in the *Chh. of Rome*, member of a religious order professing and following a certain rule of life, as distinguished from the secular clergy (see REGULARS): soldier of the permanent army. REG'ULARLY, ad. *-lĭ*. REG'ULAR'ITY, n. *-lăr'ĭ-tĭ*, agreeableness or accordance with rule or established practice; certain order; method; steadiness in a course. REGULAR FIGURES, in *geom.*, bodies whose sides and angles are equal, of which there are five kinds (see REGULAR PLANE FIGURES). REG'ULATE, v. *-lāt* [mid. L. *regulātus*, regulated]: to adjust

by rule; to put or keep in good order; to dispose; to arrange; to subject to rules or restrictions. REG'ULATING, imp. REG'ULATED, pp. REG'ULATOR, n. *-lā-ter*, the small spring of a watch which regulates its motions; the part of any machine which regulates its movements. REG'ULA'TION, n. *-lā'shŭn*, the act of regulating; a rule or order prescribed by a superior. Military and Naval Regulations are the official codes of rules for guidance of officers in all cases in which uniformity of practice is requisite, and which cannot rightly be left to individual discretion: they are in three classes, those affecting drill, discipline, and finance. REG'ULATIVE, a. *-lā-tĭv*, tending to regulate.—SYN. of 'regular, a.': methodical; orderly; normal; periodical; symmetrical; —of 'regulate': to arrange; order; adjust; dispose; rule; govern; methodize; direct;—of 'regulation': rule; order; law; decree; method; principle.

REGULAR CANONS (Lat. *Canonici Regulares*, canons bound by rule): members of the canonical bodies of cathedral clergy which adopted the reform for those clergy introduced in the 11th c. They were thus distinguished from the so-called 'secular canons,' who continued exempt from rule, and who are represented in modern times by the canons, prebendaries, and other members of cathedral chapters, in those churches in which the full cathedral system of the Rom. Cath. Church is maintained. The rules of the regular canons being variously modified in different countries and ages, a variety of religious orders arose therefrom, Augustinians, Premonstratensians, etc. see CANON: AUGUSTINS.

REGULAR PLANE FIGURES: surfaces whose perimeters are equilateral and equiangular polygons. They are named according to the number of sides which compose the perimeter, being triangles, squares, pentagons, hexagons, etc., according as they have 3, 4, 5, 6, etc., sides respectively; and to all except the *Square* (q.v.) the prefix 'regular' or 'equilateral and equiangular' is applied, to distinguish them from other plane figures which have an equal number of sides, but have not all their sides and angles equal. Circles can be inscribed in and described about all regular figures: see POLYGONS. *Regular bodies, solids, or polyhedrons* are those solids whose sides are plane figures, all the plane figures being equal, similar, and regular. The number of such bodies is necessarily very limited; in fact, no more than *five* such bodies are possible: they are the tetrahedron or equilateral pyramid, the hexahedron or *cube*, the octahedron or body bounded by eight equal and equilateral triangles, the dodecahedron or body contained under 12 regular pentagons, and the icosahedron or body contained by 20 equal and equilateral triangles: the sides or faces of the first, third, and fifth of these solids are equilateral triangles; those of the second are squares; and those of the fourth are regular pentagons. These five regular solids were described by Plato; they are thence generally known as the Platonic bodies, or Plato's five solids.

REGULARS, or REGULAR CLERGY: those of the clergy, in the Rom. Cath. Church, who belong to the monastic orders or religious congregations, and thus live under an established rule, commonly the three vows of poverty, chastity, and obedience. The name R. is in distinction from 'secular,' the term applied to the clergy employed in the ordinary parochial duties, or not withdrawn from liability to such duties. Thus, the name R. comprises all friars, monks, regular canons, clerks of the missions, and, in general, all members of clerical congregations who live under an approved rule.

REGULUS, n. *reg'ū-lus* [L. *reg'ulus*, a petty king—from *rex* or *régem*, a king]: term applied by the old chemists to several inferior metals when freed from impurities, as antimony, arsenic, bismuth, etc.; now sometimes used in a generic sense for metals in different stages of purity, but still retaining to some extent the impurities of their state of ore. Thus, when the ore sulphuret of copper is smelted, the product of the different furnaces through which it passes is called regulus until it is nearly pure copper. The name, which signifies 'little king,' was given by the alchemists to the metal antimony first, on account of its power to render gold brittle. In *ornith.*, genus of insessorial birds allied to the wren (see GOLDEN-CRESTED WREN). REGULUS, a fixed star of the first magnitude.

REGULUS, *rég'ū-lus*, MARCUS ATILIUS: favorite hero with the Roman writers: Roman consul for the first time B.C. 267, who for his successes against the Sallentini, obtained the honor of a triumph. Chosen consul a second time B.C. 256, he was sent in the 9th year of the first Punic war with his colleague L. Manlius Vulso at the head of an army on board of 330 ships against the Carthaginians, whose fleet he met and totally defeated off Heraclea Minor. R., after landing, had such success in battle that Manlius and half the army were recalled to Rome; but at last, B.C. 255, he met total defeat; 30,000 Romans were left dead on the field, about 2,000 fled, and R., with 500 more, was taken prisoner. R. remained in captivity five years; but when reverses induced the Carthaginians to solicit peace, R. was released on parole and sent to Rome in company with the Punic envoys. The rest of his history is one of the most favorite of tales with the Roman poets and historians, as a model of supreme heroism. They record how he earnestly dissuaded the Roman senate from agreeing to any of the Carthaginian proposals, even to an exchange of prisoners, of which he was one (though no reason appears why such an exchange should not have been effected); and how, after he had succeeded in obtaining the rejection of the Carthaginian offers, he resisted all persuasions to break his parole and remain in Rome, though aware of the fate that awaited him, and, refusing even to see his family, returned with the ambassadors to Carthage, where the rulers, maddened by the failure of their schemes through his instrumentality, put him to death by the most horrible tortures. The story is, that when the news of this event reached Rome, retaliations

equally atrocious were committed on two of the noblest Carthaginian prisoners. Unfortunately this noble instance of heroic patriotism has not even been noticed by Polybius (about B.C. 200), though he details at great length the other achievements of R.; and Palmerius (Pamimier de Grentesmesnil) and Beaufort, two eminent historical critics, have adduced strong reasons for the story being merely invented to excuse the horrible treatment of the captive Carthaginians. Niebuhr roundly declares the story a forgery, and believes that R. died a natural death; though, except the silence of Polybius (utterly unaccountable on the supposition of the common story being true), there would be no reason to doubt the statement in which all the other Roman historians agree, that he was put to death by the Carthaginians.

REGUR, n. *rē'gĕr:* native name for the cotton soil of India, a bluish-black or greenish-gray loam, which has yielded a consecutive succession of crops—one of cotton, and two of corn—for 20 centuries. It is 3 to 20 ft. thick, and covers extensive level tracts in the peninsula.

REGURGITATE, v. *rē gĕr'jĭ-tāt* [mid. L. and It. *regurgitare*, to overflow—from L. *re*, again; *gurges* or *gur'gitem*, a whirlpool]: to throw or pour back, or cause to surge back; to throw back in great quantity. REGUR'GITATING, imp. REGUR'GITATED, pp. REGURGITA'TION, n. *-tā'shŭn*, the act of flowing or pouring back by the same orifice; the act of swallowing again; the natural and easy vomiting of food by infants.

REHABILITATE, v. *rē'hă-bĭl'ĭ-tāt* [F. *réhabiliter;* Sp. *rehabilitar*, to reinstate—from L. *re*, again; *habeo*, I have]: to reinstate; to restore to former rank or privileges, or to rights which had been lost or forfeited—a term of the civil and canon law. REHABIL'ITATING, imp. REHABIL'ITATED, pp. REHABILITA'TION, n. *-tā'shŭn* [F.], restoration to former rights.

REHEAR, v. *rē-hēr'* [*re*, again, and *hear*]: to hear again; to try a second time. REHEAR'ING, imp.: N. in *law*, a second hearing or trial. REHEARD', pt. pp. *-hērd'*, heard a second time.

REHEARSE, v. *rē hērs'* [OF. *rehercer*, to repeat what one has already said, to harrow again—from *re*, again; *hercer*, to harrow; *herce*, a harrow]: to relate in the hearing of others; to recite; to repeat; to recite in private preparatory to a public performance. REHEARS'ING, imp. REHEARSED', pp. *-hērst'*. REHEARS'ER, n. *-ẽr*, one who rehearses. REHEARS'AL, n. *-ăl*, a recital; a telling, as of particulars in detail; private recital, as of a dramatic piece before the public representation of it, or of a musical composition before its public performance.—SYN. of 'rehearse': to recount; narrate; tell; recite; recapitulate; detail; describe; relate; repeat.

REI, or Ree, or Rea, n. *rē* [Sp. *rey*, king—fr. L *rex*]: nominal unit of account in Portugal and Brazil, but no longer existing as a current coin; multiples of it, however, still form the authorized coinage in both countries. In Portugal, copper pieces of 5, 10, and 20 (*vintem* = 2 cts. nearly) reis, silver coins equivalent in value to 50, 100 (*testoon*), 200, 480 (*cruzado novo*), 500, and 1,000 (*milreis*) reis, and gold pieces of 1,000, 2,000, 4,000 (*moeda douro*), 5,000, 6,400, 10,000 (gold crown), and 12,800 (*dobra*) reis, are the current coin of the realm; but accounts are kept almost exclusively in milreis and reis. 20 reis, or a *vintem*, equal 2 cents nearly: see Milrei. The milrei in Brazil is, however, equivalent to only about 54·6 cents; while that of Portugal is about $1.08. Gold and silver coins have almost disappeared in Brazil, the circulating medium consisting of notes of a milrei and upward, together with copper and bronze coins.

REICHENAU, *rī'chĕn-ow:* island in the Zellersee, Untersee, or w. arm of the lake of Constance; 3 m. long, 1 m. wide; it is connected with the e. shore by a causeway 1 m. long. It belongs to the duchy of Baden. It is divided into 3 parishes, Oberzell, Niederzell, and Mittelzell. R. takes its name from a Benedictine abbey, *Augia Dives*, founded in the 9th c. and famed in the middle ages for the learning of its monks as well as for its wealth. The abbey chh., now the parish chh. of Mittelzell, contains the tomb of King Charles the Fat. R. is a picturesque island, and produces abundance of grain and wine. It contains many interesting memorials of Roman and Carlovingian times. Pop. (1885) 1,500.

REICHENBACH, *rī'chĕn-bäch:* flourishing manufacturing town of Saxony, 11 m. s.w. of Zwickau. It contains wool and cotton mills, stoneware and other factories; and produces extensively woolen fabrics, leather, nankeens, lace dresses, damask napkins, waistcoatings, and hosiery. Pop. (1880) 16,509; (1890) 21,498.

REI'CHENBACH: town of Prussian Silesia, on the right bank of the Peilbach, romantically situated at the foot of the Eulen Mts., 46 m. by railway s.e. of Liegnitz. It has cotton factories, and carries on linen and woolen manufactures, yarn bleaching, dyeing, and printing. Pop. (1880) 7,255; (1885) 7,368; (1890) 13,040.

REI'CHENBACH, Karl, Baron von: German naturalist and technologist; 1788, Feb. 12—1869, Jan. 19; b. Stuttgart, cap. of Württemberg. He was educated at Tübingen, receiving the degree Ph.D. He soon formed a project of founding a new German state in the South Sea, but his plans were suspected of some hidden political significance, and R. was imprisoned in the fortress of Hohenasperg. On his release he turned his attention to the natural sciences, and their application to the industrial arts; and with Hugh, Count of Salm, he established various manufactories in Moravia 1821, which he superintended so effectively that with the proceeds he bought large estates, including the château of Reisenberg. He was created a

baron by the king of Würtemberg. R.'s position as manager of his manufactories gave opportunity for scientific investigation, which brought to light many new facts of much value, especially as to the compound products of distillation of organic substances; among which he made known creasote (1833), and Paraffin (q.v.). In later years he went into speculations less practical, and discovered, as he thought, a new force in nature (see Od). Among his literary works are, *Geologische Mittheilungen aus Mähren* (Vienna 1834); and several works on 'odic force,' pub. 1852–58 mostly at Stuttgart. He died at Leipzig.

REICHENBERG, *rī'chĕn-bĕrch:* largest town, after Prague, in Bohemia in the most populous and industrious district of the Austrian monarchy, in a romantic valley on the Neisse, 52 m. n.n.e. of Prague. Linen, cotton, and woolen fabrics are manufactured; also firearms, hats, leather, shoes, gold and silver wares, musical instruments, etc. Pop. (1880) 28,090; (1890) 31,033.

REICHENHALL, *rī'chĕn-hâl:* small town of Bavaria, on the Saal, 8 m. s.w. of Salzburg. It was almost wholly consumed by fire 1834, and has since been handsomely rebuilt. It is the centre of the Bavarian salt-works. Of its 18 salt-springs, which burst forth about 50 ft. below the surface of the ground, and to which a spacious shaft has been sunk, some are so strong in the brine as to be fit for boiling at once; but generally they are subjected to a preliminary evaporating process. The strongest and most abundant spring, containing 24 per cent. of salt, and yielding 3,300 cubic ft. of water every 24 hours, is perhaps the most copious salt spring in the world: from it alone about 200,000 cwts. of salt are obtained annually. A brine conduit, 60 m. in length, conveys the water of salt-springs from Berchtesgaden, through R., over mountains nearly 2,000 ft. high, to Traunstein and Rosenheim, in the vicinity of which abundant timber for fuel is procurable. Pop. (1880) 3,271; (1885) 3,436; (1890) 3,791.

REICHSRATH, n. *rīchs'rät* [Ger., council of the empire: *reich*, kingdom; *rath*, council]: the imperial parliament of the Austrian empire. Reichstag, n. *rīchs'täg* [Ger., imperial diet: *reich*, kingdom, realm; *tag*, a day]: in *Ger.*, meeting of the states of the empire; the German parliament.

REICHSTADT, Napoleon, François Charles Joseph, Duke of, entitled by the Bonapartists Napoleon II: 1811, Mar. 20–1832, July 22; b. Paris; son of Napoleon I. by Maria Louisa of Austria. His father's joy at his birth was unbounded: '*C'est un roi de Rome,*' he cried to the crowd of congratulators who pressed into his apartments on hearing the news. The infant prince was baptized June 9 in the cathedral of Notre Dame by Card. Fesch. After the reverses of 1814, Napoleon abdicated in favor of his son; but the senate took no notice of Napoleon II. and called Louis XVIII. to occupy the French throne; whereupon Maria Louisa and her child removed to the palace of Schönbrunn near Vienna, where they remained

till the treaty of Vienna had rearranged the affairs of Europe. Maria Louisa then took possession of the sovereign duchy of Parma which had been conferred on her, while her son remained at the Austrian court with his grandfather Franz I., who was much attached to him. By an imperial patent, 1818, July 22, he was created Duke of R., with rank of an Austrian prince. He received a liberal education, but never had robust health, nor showed a vigorous intelligence. At the July revolution 1830, his name was mentioned as a candidate for the French throne; and Talleyrand, it is even believed, proceeded to Vienna to advocate his cause; but was coldly received, and the project dropped. The constitution of the poor youth was undermined by laryngeal phthisis, and he died at Schönbrunn. His last words, addressed to his mother, were '*Ich gehe unter, meine Mutter, meine Mutter!*' He was interred with magnificent pomp in the imperial tomb at Vienna.

REID, *rēd*, MAYNE: author; 1818–1883, Oct. 22; b. Ireland. He came to this country 1838, made various hunting expeditions in the region of the Red and Missouri rivers, and travelled extensively in all parts of the Union. He then spent some time in Philadelphia and wrote for several periodicals. He served with great credit as capt. of U. S. troops in the Mexican war, and with a company which he had gathered went to Europe 1849 to aid the Hungarians in their revolution, but the conflict was ended before they reached port. He spent some years in England, and became a famous writer of stories for boys. His works deal largely with thrilling adventure. Among the nearly 50 vols. which he published were *The Rifle Rangers* (1850); *Osceola* (1858); *The Maroon* (1862); and *The Cassiques* (1870). His works were published in 15 vols. (1868), and other editions have since appeared. He died in England.

REID, SAMUEL CHESTER: naval officer; 1783, Aug. 25—1861, Jan. 28; b. Norwich, Conn.; son of Lieut. John R. of the British navy. When 11 years of age he went to sea; was taken prisoner by a French privateer, and later became a midshipman in the U. S. navy. He was in command of the *General Armstrong*, a privateer brig, in the war of 1812; and 1814, Sep. 26, 27, fought a remarkable battle with the boats from three heavily armed Brit. warships at Fayal, in the Azores. He had only 7 guns and 90 men. The Brit. loss was 120 men killed and 180 wounded; the American loss two killed and seven wounded. R. scuttled the privateer, and with his crew escaped to land, where they fortified an old convent, but were not attacked. The Brit. govt., after prolonged correspondence, made an apology for the attack on an American vessel in a neutral port. The result of the engagement was important: it prevented the Brit. ships from promptly attacking New Orleans, and so enabled Gen. Jackson to reach the city in time to save it from capture. R. became a sailing-master in the navy, was warden of the port of New York, invented and erected signal telegraphs, had charge of the pilot boat service, and designed the present style of the U. S. flag. He died at New York.

REID, Thomas: 1710, Apr. 26—1796, Oct. 7; b. Strachan, county parish in Kincardineshire, Scotland, where his father was the Presb. clergyman. His mother was of the family of the Gregories (q. v.). R. began his education at the parish school, and at the age of 12 became a student of Marischal College in Aberdeen. He took his degree M.A. 1726, and remained in Aberdeen as college librarian, his chief studies being mathematics and the philosophy of Newton. In 1736 he went with a friend to England, where he was introduced to distinguished men in Oxford, Cambridge, and London. In 1737 he was presented by the senatus of King's College to be minister of the parish-church at New Machar in Aberdeenshire. The parishioners were bitterly opposed to his appointment, but his conduct and manner gradually won them. It is said that, from distrust of his powers, instead of composing for the pulpit himself, he preached the sermons of the English divines Tillotson and Evans. In 1740 he married his cousin, who greatly aided in the work of his parish. In 1739 Hume's *Treatise on Human Nature* appeared; and its perusal was the impulse that determined his future philosophical career. He had fully adopted the idealism of Berkeley, but being now revolted by the conclusions drawn from it by Hume, sought a new foundation for the common notions as to a material world. In 1748 he contributed to the Royal Soc. of London a short essay on *Quantity*, occasioned by what he considered an abusive application, by Hutcheson, of the forms of mathematical reasoning to ethics. In 1752 he was appointed one of the professors of philosophy in King's College, Aberdeen. Here he followed the established course of teaching in three successive years to the same students mathematics, nat. philosophy, and moral philosophy. He was active in all the business of the university. He also founded a Literary Soc. in Aberdeen, which had among its members Campbell, Beattie and other men of ability to this soc he submitted his first draft of the *Inquiry into the Human Mind*. In 1763 he was chosen to succeed Adam Smith as prof. of moral philosophy in the Univ. of Glasgow. Thus freed from the duty of teaching physical science, he applied himself thenceforth to metaphysical and mental speculation. In 1764 he published his *Inquiry*. His thirst for general science never left him: at the age of 55, he attended Black's lectures on Heat. In 1781 he retired from his chair to give his remaining strength to the publication of his works on the mind. In 1785 the *Philosophy of the Intellectual Powers* appeared: 1788 the *Active Powers* —treatises usually regarded as constituting the first complete and systematic work on the science of the human mind. In 1774 he had contributed his account of Aristotle's logic to Lord Kames's *Sketches*. The publication of the *Active Powers* closed his career as author, though to the end of life he kept his bodily and mental vigor.—See Common Sense, The Philosophy of. He was under the middle size; but had great muscular strength, and was addicted to exercise in the open air. His only surviving daughter cared for him after his wife's death 1792.

R. had many points of resemblance to his great contemporary Kant. Both were occupied till middle life with mathematical and physical studies; both were roused to metaphysical research by Hume, and each became in his own country the chief of a school whose aim was to deliver philosophy from skepticism, and to do so by resting finally on principles of intuitive, or *a-priori* origin.—R.'s refutation of Berkeley, notwithstanding the powerful support of Hamilton, is now generally considered a failure. His own account of the motives that led him to abandon Idealism proves that he completely misconceived the real drift of that famous speculation.

REID, Whitelaw: journalist and diplomat: b. Xenia, O., 1837, Oct. 27. He graduated at Miami Univ. 1856; entered political life and took the stump for Frémont in the presidential campaign of the same year; became editor of the Xenia *News* and Columbus correspondent of the Cincinnati *Gazette;* and at the beginning of the civil war was appointed war correspondent of the *Gazette*, writing under the pen name 'Agate.' He held a staff appointment with Gen. Rosecranz, was attached to the Army of the Cumberland for some time, and was present at the battles of Shiloh and Gettysburg. 1863–66 he was librarian of the house of representatives at Washington, and after the war engaged in cotton-planting in La. for a short time. In 1868 he removed to New York on invitation of Horace Greeley, and became an editorial writer on the *Tribune*. A year latter he succeeded to the managing editorship, and during Greeley's presidential campaign 1872 he had full control of the paper. On the death of Greeley, R. became editor and chief owner of the paper. He declined the office of U. S. minister to Germany, tendered by Presidents Hayes and Garfield, and held the mission to France 89–92. He is a life regent of the Univ. of N. Y. In 1892 he ran for vice-pres., on the repub. ticket, and was defeated. In 1897 he was appointed special envoy to represent the U. S. at Queen Victoria's diamond jubilee. R. has published *After the War* (Cincinnati 1866); *Ohio in the War* (2 vols. Cincinnati 1868); *Schools of Journalism* (New York 1871); *The Scholar in Politics* (1873); *Some Newspaper Tendencies* (1879); and *Town-Hall Suggestions* (1881).

REIGATE, *rī'gāt:* municipal borough and thriving market-town of Surrey, England; pleasantly situated at the s. base of the North Downs, 23 m. s. of London by the South-eastern railway. From very early times, it was considered a place of strength; and after the Conquest, it was granted to the Earls of Warrenne. Of the castle built by these earls, there are only slight remains; but beneath the site are several large vaults or caverns, excavated in the sandstone not earlier than the 13th c. The church is in various styles of architecture—the oldest portions dating from the 12th c. Under its chancel is buried Charles Howard, Earl of Effingham, Elizabeth's lord high admiral, conqueror of the Spanish Armada. Pop. (1871) 15,916; (1881) 18,656; (1891) 22,646.

REIGN, v. *rān* [L. *regnāre*, to rule or govern—from *rex* or *regem*, a king: It. *regnare*: F. *regner*, to reign]: to rule as a king; to hold sovereign power; to be predominant: N. royal power; sovereignty; the time during which a king rules; empire; power; influence. REIGN'ING, imp. REIGNED, pp. *rānd*.—SYN. of 'reign, v.': to govern; direct; control; rule; prevail.

REIGN OF TERROR: that period in the history of France when the revolutionary govt., under the guidance of Maximilien Robespierre, supported itself by the pure operation of terror, exterminowing with the guillotine all the enemies, or supposed enemies, of the democratic dictatorship. In 1793 the convention vested the govt. in a 'Committee of Public Safety,' a body belonging to the party of the Mountain (q.v.), and of which Robespierre, Couthon, and St. Just became the triumvirate. This committee, to which every other authority in the country was subjected, deliberated in secret, and the convention sanctioned all its decrees. Louis XVI. had already been brought to the scaffold, and Oct. 16, his queen, Marie Antoinette, after being subjected to every indignity, was beheaded, the Princess Elizabeth suffering the same fate 1794, May. The execution of the Girondists (q.v.) followed, and that of the Duke of Orleans. The guillotine became the only instrument of government: a look or a gesture might excite suspicion, and suspicion was death. The Calendar was remodelled, and all religious rites suppressed. When the power of the Committee had attained its climax, a decree was passed abrogating every delay or usage calculated to protect an accused person: but from that moment a reaction began. A section of the Mountain party were satiated with blood, and had become impatient of the control of Robespierre. 1794, July 28, he was denounced in the convention for his barbarities; and his death (see ROBESPIERRE) brought to a close this frightful era in French history.

REI'KIAVIK: see ICELAND.

REILLUMINATE, v. *rē-il-lū'mi-nāt* [*re*, again, and *illuminate*]: to enlighten again; to reillumine.

REILLUMINE, v. *rē-il-lū'min* [*re*, again, and *illumine*]: to enlighten again.

REIMARUS, *rī-mā'rŭs*, HERMANN SAMUEL: German philologist: 1694–1765; b. Hamburg, where his father was prof. at the Johanneum Gymnasium. He visited the universities at Jena and Wittenberg, travelled in Holland and England; and was, on his return, elected Rector at Wismar, and subsequently prof. of Hebrew and mathematics at the Gymnasium of Hamburg; and there he died. He is author of the so-called 'Wolfenbüttelsche Fragmente eines Unbekannten,' first published by Lessing in his *Beitrage zur Geschichte und Literatur aus den Schätzen der Wolfenbüttelschen Bibliothek*. These 'Wolfenbüttel Fragments' till then known only in MS. by a few of R.'s intimate friends, produced profound sensation throughout Germany: since in them the author boldly denied the supernatural

origin of Christianity. Another work, in the same direction, is his *Vornehmste Wahrheiten der Natürlichen Religion;* of miscellaneous character are *Primitia Wismariensia, De Vita Fabricii, Dissertatio de Assessoribus Synedrii Magni,* etc. His ed. of *Dio Cassius* is one of the most valuable contributions to classical philology.

REIMBURSE, v. *rē'im-bėrs'* [F. *rembourser;* It. *rimborsare,* to reimburse (see PURSE)]: to refund; to repay or return what has been taken, lost, or expended. REIMBURS'ING, imp. REIMBURSED', pp. *-bėrst'*. REIMBURS'ER, n. *-bėrs'ėr*, one who reimburses. REI'MBURSE'MENT, n. *-mėnt*, repayment of what has been taken, lost, or expended; the act of making good, as loss or expense.

REIMPLANT, v. *rē'im-plānt'* [*re*, again, and *implant*]: to implant again.

REIMPORT, v. *rē'im-pōrt'* [*re*, again, and *import*]: to import again; to reconvey. REIMPORTA'TION, n. the act of reimporting; that which is reimported.

REIMPOSE, v. *rē'im-pōz'* [*re*, again, and *impose*]: to impose anew, as a tax.

REIMPREGNATE, v. *rē'im-prėg'nāt* [*re*, again, and *impregnate*]: to impregnate again.

REIMPRESS, v. *rē'im-prės'* [*re*, again, and *impress*]: to impress anew. REI'MPRES'SION, n. a second or repeated impression.

REIMPRINT, v. *rē'im-print'* [*re*, again, and *imprint*]: to imprint again.

REIMPRISON, v. *rē'im-priz'n* [*re*, again, and *imprison*]: to imprison again, or after a release from prison. REI'MPRIS'ONMENT, n. the act of confining again in prison after a release from it.

REIMS: see RHEIMS.

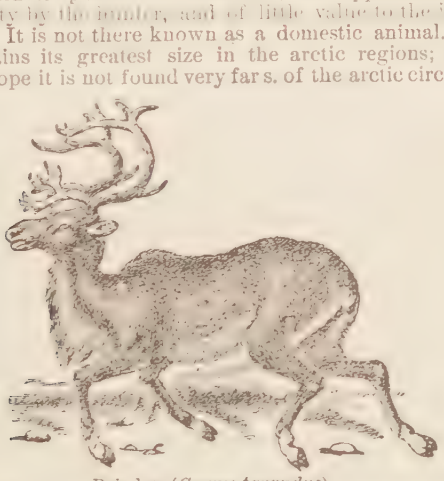
REIN, n. *rān*, plu. REINS, *rānz* [OF. *resne* or *reine;* F. *rêne;* It. *redina;* Sp. *rienda*, a rein or bridle: Bret. *rêna*, to direct or govern: L. *retinaculum*, a tether—from *retinēre*, to hold in: comp. Gael. *srian*, a bit]: the straps of a bridle which extend from the horse's mouth to the hands of the rider or driver, and by which the horse is restrained and guided; the instrument or power of curbing or restraining; government: V. to govern by a bridle or reins; to control; to restrain. REIN'ING, imp. REINED, pp. *rānd*. REIN'LESS, a. *-lės*, without restraint; unchecked. TO GIVE THE REINS TO, to give license; to allow to be without control. TO TAKE THE REINS, to assume control.

REINCENSE, v. *rē'in-sėns'* [*re*, again, and *incense*]: to incense again.

REINCORPORATE, v. *rē'in-kŏr'pō-rāt* [*re*, again, and *incorporate*]: to incorporate again; to embody anew.

REINCUR, v. *rē'in-kėr'* [*re*, again, and *incur*]: to incur a second time.

REINDEER, n. *rāin'dēr* [Icel. *hreinn;* Ger. *rennthier;* Dut. *rendier;* Dan. *rensdyr*, a reindeer], (*Cervus tarandus* or *Tarandus rangifer*): species of Deer (q.v.), native chiefly of the arctic regions; by far the most valuable and important of all the species of deer, and the only one which has been thoroughly domesticated and brought into service by man. It is found wild in Europe, Asia, and America, in Spitzbergen. The Caribou, or American R., of N. America s. to Maine, and the Barren Ground Caribou of Greenland and n. British America, are regarded as but varieties of the R. It is not a native of Iceland, but was introduced by Gov. Thodal 1770, and soon became thoroughly naturalized; great herds now roaming over the wildest parts of the interior, but approached with difficulty by the hunter, and of little value to the inhabitants. It is not there known as a domestic animal.—The R. attains its greatest size in the arctic regions; and in w. Europe it is not found very far s. of the arctic circle; but



Reindeer (*Cervus tarandus*).

in Siberia and in America its range extends much further s.—in America, almost to the latitude of Quebec; and in w. Asia, along the whole chain of the Ural Mountains, and even to the s. of Astrakhan, almost to the Caucasus.

The wild R. of Lapland is almost equal in size to the stag, but there are great differences of size in different districts, the largest size being attained generally in high polar regions. The domesticated R. is never so large as the largest wild ones; but the domesticated R. of Siberia is, as also the wild one, much larger than that of Lapland. The R. is very inferior in gracefulness to the stag, and, indeed, to most species of deer, being of rather heavy appearance, with comparatively short and stout limbs, the withers much elevated as in the elk, and the neck carried almost straight forward. The tail is very short. There is little or no mane, but the hair of the lower parts of the neck is very long and shaggy. Both sexes have large horns, those of the male being larger, often more than four ft. long. They are slender and cylindrical almost to the

tip in young animals, but in old ones become palmated there, though still slender and cylindrical at the base; they are more or less branched, and from the base spring one or two branches, comparatively short, but also in old animals much palmated, so that the armature of the head is of peculiar appearance. The R. is said to use its horns to remove the snow from the lichens (see REINDEER MOSS), which form great part of its winter food; it also scrapes up the snow with its feet and turns it up with its snout; and by a beautiful provision of nature, the feet, forehead, and nose are protected by a remarkably hard skin. The R. is gregarious, partially migratory—its migrations, however, regulated not by climate, but by facility of obtaining food. To the Laplander the R. constitutes the chief part of his wealth; and many Laplanders possess herds of 2,000 or more, which they feed chiefly in the mountainous tracts in summer, and in the lower grounds in winter. The flesh is excellent; as is also the milk, which is much used. The skins are used for clothing, tents, and bedding. The hard skin of the face and feet is valued by the Laplanders for making shoes. The R. is also extremely valuable as a beast of draft, for which purpose it is harnessed to sledges. It is capable of maintaining a speed of nine or ten m. an hour for a long time, and can easily draw a weight of almost 200 lbs. besides the sledge. It is much employed for this purpose in Siberia as well as in Lapland; but in America it is merely an object of chase, valued for its flesh, fat, and hide. Among other methods resorted to by the Esquimaux and other Indians for its capture is that of making pits in the snow, covered with a slab of ice, which revolves on its own centre when the R. sets foot on it. The flesh and fat are made into Pemmican (q.v.), besides being used in a fresh state. A very thick layer of fat lies under the skin of the back of the male.—The R. suffers grievously during summer from the attacks of various kinds of insects, particularly of a species of Bot (q.v.), which is sometimes even destructive.

REIN'DEER MOSS (*Cenomyce rangiferina* or *Cladonia rangiferina*): lichen of great importance to the Laplanders and other inhabitants of the northernmost regions of Europe and Asia, as forming the chief winter food of the reindeer. It is found in almost all parts of the world, but is most abundant and luxuriant in the arctic regions. It is common in Britain, growing in moors and on mountains. It covers extensive tracks in Lapland and other far northern countries, making them even in summer as white as snow, and often thus occupies the ground in pine forests. When pine forests are destroyed by fire, it soon springs up in its greatest luxuriance. It is a very variable plant, but always consists of a much-branched erect cylindrical

Reindeer Moss (*Cenomyce rangiferina*).

tubular thallus, with small perforations in the axils, and attains a height of two inches and upward. The branches of plants which grow together usually mix intricately into one mass. The importance of this lichen was brought into notice first by Linnæus in a beautiful passage of *Flora Lapponica*. The reindeer reach it by scraping with their feet, even when it is covered with very deep snow. It is capable of being used for human food, and was recommended for this purpose in times of dearth by an edict of Gustavus III. of Sweden. Its taste is pleasant, though attended with a slight pungency or acridity. It is generally boiled in reindeer milk. Its nutritious qualities depend chiefly on the Lichenin (q.v.) which it contains.

REINDUCE, v. *rē-in-dūs'* [*re*, again, and *induce*]: to induce again.

REINFORCE, v. *rē-in-fōrs'* [*re*, again, and *enforce*]: to strengthen with new force, assistance, or support—particularly used in reference to military or naval operations. *N.* in *gunnery*, the two sections of the length of a smooth bore gun which are next the breech: the first reinforce is between the base ring, and that next in rear of the trunnions: the second is between the first reinforce and the ring in front of the trunnions: the gun is made thicker at these parts, to resist more effectually the explosive action of the powder. The thickness of metal is less at the second reinforce than at the first, the powder being considered to have already exerted its greatest disruptive force, though this conclusion is open to question. The first and second reinforce are shown (with their reinforce rings) at AC, CD, in the figure under GUN. RE'INFORC'ING, imp. RE'INFORCED', pp. *-fōrst*. RE'INFORCE'MENT, n. an additional force; fresh assistance; any augmentation of strength or force by adding something.

REINFORM, v. *rē-in-fawrm* [*re*, again, and *inform*]: to inform anew.

REINFUSE, v. *rē'in-fūz'* [*re*, again, and *infuse*]: to infuse again.

REINHABIT, v. *rē'in-hab'it* [*re*, again, and *inhabit*]: to inhabit again.

REINKENS, *rīn'kens*, JOSEPH HUBERT, D D.: bishop of the Old Catholic Chh.: b. 1821, Mar. 1, at Burtscheid near Aix-la-Chapelle. Entering the Univ. of Bonn 1844, he wrote the prize essay in philosophy on the *Greek Idea of Virtue*, in his first year. He studied in the ecclesiastical seminary at Cologne 1847–8, and took the degree D D at Munich 1849. He studied chh. history at Breslau 1850–52, and in 1852 was second cathedral preacher, and 1853 first cathedral preacher: he was appointed prof. of theology 1857. He incurred ecclesiastical censure 1870 by his work *Pope and Popedom*, and the chh. authorities tried in vain to hinder the publication, the same year, of his work on *Papal Infallibility*. He was suspended from the priesthood 1870, Nov. 20, because of his having signed with Döllinger and others, the Nürnberg manifesto against the Vatican Council. Afterward he devoted him-

self to promotion of the Old Catholic movement. He was consecrated bp. 1873 by Dr. Heykamp, Bp. of Deventer, Holland. He wrote very many books on historical and doctrinal questions at issue between the Roman Chh. and the Old Catholics. He d. 1896, Jan. 5.

REINQUIRE, v. *rē-in-kwīr'* [*re*, again, and *inquire*]: to inquire a second time.

REINS, n. plu. *rānz* [L. *rēnēs*, the kidneys, the reins: Gr. *phrēn*, plu. *phrēnes*, the parts about the heart: It. *reni*; F. *reins*, the reins]: the kidneys, or the parts about them; the loins, or lower part of the back; in *Scrip.*, the inward parts; the seat of the affections and passions.

REINS (of a horse): see REIN.

REINSERT, v. *rē-in-sėrt'* [*re*, again, and *insert*]: to insert a second time. RE-INSER'TION, n. a second insertion.

REINSPECT, v. *rē-in-spėkt'* [*re*, again, and *inspect*]: to inspect again. RE-INSPEC'TION, n. the act of inspecting a second time.

REINSPIRE, v. *rē-in-spīr'* [*re*, again, and *inspire*]: to inspire anew.

REINSPIRIT, v. *rē-in-spir'it* [*re*, again, and *inspirit*]: to inspirit anew.

REINSTALL, v. *rē-in-stawl'* [*re*, again, and *install*]: to install again; to seat anew. RE-INSTAL'MENT, n. a second instalment.

REINSTATE, v. *rē-in-stāt'* [*re*, again, and *instate*]: to place again in a former state; to restore. RE-INSTAT'ING, imp. RE-INSTAT'ED, pp. RE-INSTATE'MENT, n. the act of restoring to a state from which one had been removed.

REINSTRUCT, v. *rē-in-strukt'* [*re*, again, and *instruct*]: to instruct anew.

REINSURE, v. *rē-in-shūr'* [*re*, again, and *insure*]: to insure the same property a second time by other underwriters or in another office. RE-INSU'RANCE, n. a contract in which the first insurer is relieved by another from the risks he had undertaken.

REINTER, v. *rē-in-tėr'* [*re*, again, and *inter*]: to inter anew.

REINTERROGATE, v. *rē-in-tėr'rō-gāt* [*re*, again, and *interrogate*]: to question again or repeatedly.

REINTRODUCE, v. *rē-in-trō-dūs'* [*re*, again, and *introduce*]: to introduce again. RE-INTRODUC'TION, n. a second introduction.

REINUNDATE, v. *rē-in-un'dāt* [*re*, again, and *inundate*]: to inundate again.

REINVEST, v. *rē-in-vėst'* [*re*, again, and *invest*]: to invest anew. RE-INVEST'MENT, n. the act of investing anew; a second investment.

REINVESTIGATE, v. *rē-in-vės'ti-gāt* [*re*, again, and *investigate*]: to investigate again.

REINVIGORATE, v. *rē'in-vig'o-rāt* [*re*, again, and *invigorate*]: to revive; to reanimate.

REINVOLVE, v. *rē'in-volv'* [*re*, again, and *involve*]: to involve anew.

REIS, *rēz*, n. plu. of REI: see REI.

REIS, or RAIS, n. *rīs*, or RAS, *rās* [Ar. *reïs*, *raïs*, prince, chief, or head]: a common title over the whole East for various persons in authority, as the *reïs*, i.e., captain, of a ship. REIS EFFENDI, n. *rīs'-ef-fen'dē*, in *Turkey*, the title formerly given to the chancellor of the empire, and minister for foreign affairs.

REISSUE, v. *rē-ish'ū* [*re*, again, and *issue*]: to issue a second time: N. a second or repeated issue.

REITERATE, v. *rē-it'ėr-āt* [F. *réitérer*, to reiterate—from L. *re*, again; *iterātus*, repeated—from *iterum*, again, a second time]: to repeat again and again; to say again that which has already been said. REIT'ERATING, imp. *-ā'ting*. REIT'ERATED, pp.: ADJ. repeated again and again. REIT'ERA'TION, n. *-ā'shŭn* [F.—L.]: repetition again and again. REIT'ERA'TEDLY, ad. *-lī*, repeatedly.—SYN. of 'reiterate': to repeat; rehearse; recapitulate.

REITERS, n. plu. *rīt'ėrz* [Ger. *reiter*, a rider, a horseman]: the German cavalry of the 14th and 15th centuries, especially in France during the religious wars.

REJECT, v. *rē-jekt'* [L. *rejectārē*, to throw or cast back—from *re*, back; *jaciō*, I throw: It. *rigettare*: F. *rejeter*]: to throw away or aside as anything useless or vile; to discard; to decline; to refuse to receive, accept, or grant. REJECT'ING, imp. REJECT'ED, pp. REJECT'ABLE, a. *-ă bl*, capable of being rejected; worthy to be rejected. REJECT'ER, n. *-ėr*, one who rejects. REJECTION, n. *rē-jek'-shŭn*, the act of throwing away or casting aside; refusal to accept or grant. REJECT'IVE, a. *-iv*, that rejects; tending to reject. REJECT'MENT, n. *-mėnt*, matter thrown away.—SYN. of 'reject': to dismiss; cast off; refuse; throw aside; repel; slight; renounce; despise; decline; rebuff.

REJOICE, v. *rē-jois'* [OF. *resjoir*; F. *rejouir*, to rejoice; *réjouissant*, joyous, gladsome: L. *re*, again; *gaudēre*, to rejoice: Sp. *regocijar*, to rejoice (see JOY)]: to experience gladness in a high degree; to be glad; to exult; to delight or gladden. REJOIC'ING, imp.: ADJ. displaying or feeling joy; animating with gladness. N. the act of expressing joy and gladness; the subject or experience of joy. REJOICED', pp. *-joyst'*. REJOIC'ER, n. *-ėr*, one who rejoices. REJOIC'INGLY, ad. *-lī*.—SYN. of 'rejoice': to be glad; joy; exult; exhilarate; gladden; delight; triumph; please; cheer.

REJOIN, v. *rē-joyn'* [*re*, again, and *join*; F. *rejoindre*, to rejoin]: to unite after separation; to join company with again; to answer to a reply. REJOIN'ING, imp. REJOINED', pp. *-joynd*. REJOIN'DER, n. *-joyn'dėr*, an answer to a reply; an answer or reply: in *law*, the pleading of a defendant in answer to a plaintiff's replication. The order of pleading is declaration, plea, replication, rejoinder, surrejoinder, rebutter, surrebutter, etc.—each party alternately delivering one of these pleadings.

REJOINT, v. *rē-joynt'* [*re*, again, and *joint*]: to reunite the joints of; to joint anew.

REJOURN, v. *rē-jėrn'* [*re*, and *adjourn*]: in *OE.*, to adjourn to another hearing; to readjourn.

REJUDGE, v. *rē-juj'* [*re*, again, and *judge*]: to re-examine; to call to a new trial and decision.

REJUVENESCENT, a. *rē-jo͞o-ven-ĕs'sĕnt* [L. *re*, again; *juvenescens*, or *juvenescentem*, becoming young again—from *juvenis*, a youth]: growing young again. REJU'VENESCENCE, n. *-ĕs'sĕns*, or REJUVENESCENCY, n. *-ĕs'sĕn-si*, a renewing of youth; state of being young again; a term applied to a form of reproduction in plants in which the protoplasm escapes from its old cell-wall and swims away.

REKINDLE, v. *rē-kin'dl* [*re*, again, and *kindle*]: to set on fire anew; to rouse again. REKIN'DLING, imp. *-dling*. REKIN'DLED, pp. *-dld*.

RELAIS, n. *rē-lā'* [F.]: in *fort.*, a narrow walk, of four or five ft. in width, left without the rampart to receive the earth which may be washed down, and prevent its falling into the ditch.

RELAND, v. *rē-lănd'* [*re*, again, and *land*]: to put on shore what had been shipped; to go on shore after having embarked.

RELAPSE, v. *rĕ-lăps'* [L. *relapsus*, sunk or fallen back—from *re*, back; *lapsus*, fallen; *labor*, I slide or glide onward: F. *relaps*, relapsed]: to slip or fall back into a former bad state; to fall back from a state of convalescence or recovery: N. a sliding or falling back into a former bad state; a return to any state; in *med.*, the return of a disease after convalescence. RELAPS'ING, imp. RELAPSED, pp. *-lăpst'*: ADJ. in the *R. Cath. Ch.*, applied to a heretic who falls back into an error which he had abjured. RELAPS'ER, n. *-ėr*, one who relapses.

RELAPSING FEVER: species of contagious recurrent fever, like one form of Remittent Bilious fever; called by numerous names in various localities; e.g., Biliary Remittent, Bilious Typhoid, Dynamic Fever, Epidemic Remittent, Gastrohepatic, Recurrent, Relapsing Bilious, Remitting Icteric, Seven-day fever, Short fever, Spirillum fever. Of these names the last is most definite, as indicating the cause—the presence in the blood of a spirillum (*Spirochæte Obermyeri*) $\frac{1}{7500}$ to $\frac{1}{5000}$ inch long. See GERM-THEORY. Although the disease has been accurately described by several physicians since 1739, its present name was given to it only about 1850 by Dr. Jenner. R. F. has often been confounded with common continued fever. It attracted special notice in Scotland 1843–4, when there was prevalent 'an epidemic fever characterized by the suddenness of its onset, its wide diffusion, its short duration, and its small mortality; by its proneness to relapses, by the frequent occurrence of petechiæ, of something like black vomit, and of yellowness of the skin; by the absence of intestinal ulcers; and by profuse sweatings, whereby the fever seemed to be solved.' This fever was supposed at the time by Alison and other eminent physi-

cians who described it, to be a hitherto unknown pestilence; but Jenner's subsequent researches showed this an error; as epidemics of this kind had occurred in Scotland or Ireland (or both simultaneously) 1736, 39, 41, 1800–1, and 1816–20. Until within recent years the cause of this fever was not known.

R. F. usually begins suddenly with rigors, a sense of chilliness and frontal headache. Febrile reaction soon sets in; the tongue is coated with thick moist whitish fur; there are pains in the head, back, and limbs, constipation or slight diarrhœa, and the skin is often so yellow as to approach to jaundice (a phenomenon never seen in typhus or typhoid fever). By the fifth or sixth day, there is sometimes delirium. After the above-described symptoms have lasted five to seven days, a sudden change takes place, beginning with a copious perspiration, followed by rapid falling of the pulse to its healthy rate (or even lower), and the patient appears nearly well. But from the fifth to the eighth day of this seeming convalescence, a sudden relapse occurs, and all the primary symptoms return; these run a rather shorter course than before and again terminate in sweating and in a second convalescence, which is in most cases permanent, though relapse may occur three or even four times. In R. F. enlargement of the spleen is frequent.

Death is a rare termination of this fever; the mortality is reported at 2 to 4 per cent.

The treatment is simple. The bowels should be opened at the beginning of the attack, and if necessary, kept open subsequently with castor oil or saline aperients. The headache must be encountered by proper local remedies, which the physician will prescribe according to the patient's state. The vomiting may sometimes be checked by effervescing draughts. The poison of this disease is specific, its phenomena are very different from those of typhus and typhoid fevers, and patients recovering from those diseases may catch, by contagion, this disease, while patients convalescent from this fever may take typhus or typhoid. It has been said to be allied to yellow fever; but it much more resembles some form of Remittent Fever (q.v.).

RELATE, v. *re-lāt* [L. *relatus*, repeated, reported -from *re*, back, and *latum*, to carry] to report, to rehearse; to give particulars, either orally or in writing; to ally by connection or kindred; to have reference or respect to; to refer to; in *OE.*, to bring back; to restore. RELA'TING, imp. RELA'TED, pp.: ADJ. allied by kindred; connected by blood. RELA'TER or RELA'TOR, n. *-la'ter*, one who relates. RELA'TION, n. *-lā'shun* [F.—L.]: act of telling; narrative; account, respect; reference; connection between things; connection by birth or marriage; kindred; a person connected by birth or marriage; direct conformity of parts to a whole and to each other. RELA'TIONSHIP, n. *-ship*, state of being connected by birth or marriage, or other alliance. RELA'TIONAL, a. *-al*, having relation or kindred. RELA'TIONALLY, ad. *-li*.—SYN. of 'relate': to tell, recite, narrate; detail; report; rehearse; recount; describe;—of 'relation':

respect; reference; regard; connection; kindred; alliance; kinsman; kinswoman; consanguinity; affinity; narrative; tale; account; recital; narration; rehearsal; detail; description.

RELATIVE, a. *rĕl'ā-tiv* [F. *relatif*, relative—from L. *relativus*, referring, relative: It. *relativo* (see RELATE)]: respecting; having reference to; pertinent; relevant; not absolute or existing by itself; incident to man in society, as rights or duties; in *OE.*, positive; close in connection; particular: N. one connected or allied by blood or affinity; that which has relation to something else; in *gram.*, one of the words *who*, *which*, *that*, so named because they relate or refer to some word or words going before (see RELATIVE PRONOUNS). REL'ATIVELY, ad. *-li*, with respect to something else; not absolutely. REL'ATIVENESS, n. *-nĕs*, the state of being relative or bearing relation. RELATIV'ITY, n. *-i-ti*, the state of being relative. RELATIVE RANK: see RANK IN THE UNITED STATES ARMY AND NAVY. RELATIVE TERMS, in *logic*, terms which imply relation, as servant and master, husband and wife.

REL'ATIVE KEYS, in Music: the keys most nearly related to any key whose scales have the greater number of their notes in common with it. The keys most nearly related to a major key, taken as principal, and into which it may most easily pass, are its *dominant*, or fifth above; its *subdominant*, or fifth below—each of which differs from it by only one sharp or one flat—and its *relative minor* key (the key which has the same signature) is in its descending scale the same, the ascending scale differing by two notes. In the same way, the keys most nearly related to a minor key are its *dominant* and *subdominant*, and its *relative major*. Thus the relative keys of C major, as principal key, are G major, F major, and A minor; and the relative keys of A minor are E minor, D minor, and C major. A more remote relationship subsists between a major key and the dominant and subdominant of its relative minor; or between a minor key and the dominant and subdominant of its relative major. A major key is also closely connected with its tonic minor, or the minor key of the same tonic, as the two keys have the tonic, dominant, and subdominant in common.

REL'ATIVE PRO'NOUNS: pronouns differing from personal and other Pronouns (q.v.) in this, that, besides standing for nouns, they at the same time have the power of conjunctions. They join sentences or clauses by *relating*, or referring back directly, to something just named. The relatives in English are *who*, *which*, and *that*. *What* is used for *that which*, thus embracing both relative and antecedent. In many cases, *who* or *which* can be resolved into a conjunction and a personal pronoun; e.g., 'At last the surgeon was called in, *who* (= *and he*) straightway amputated the limb.' 'Why consult Charles, who (= *for*, or *since he*) knows nothing of the matter?' 'Ahab seized the vineyard of Naboth, *which* (= *although—it*) he had no title to.' In cases where they are not thus resolvable, they introduce

sentences or clauses to limit nouns, the relative clause serving the purpose of an adjective; e.g., 'He picked out all the men *who had blue eyes*' (= *the blue-eyed*). 'The house *which stands* (= *situated*) half-way up the hill is the most cheerful.' Relative clauses of this kind may often be omitted without detracting from the meaning of the sentence, and with positive gain in conciseness; e.g., in the last example 'which stands' or 'situated' may be omitted.

Who is employed when the reference is to persons, and *which* when it is to inferior animals or things. *That* is applied to both persons and things; but it does not follow that it may be used at pleasure instead of *who* or *which*. Whenever a *who* or *which* is resolvable as above described, the substitution of *that* would alter the meaning; e.g., in one of the examples above, it would make the sentence declare that Ahab seized the particular one of Naboth's vineyards to which he had not a title; implying that he had a title to some other vineyard or vineyards of Naboth. Though some recent authorities favor a more general use of *that*, the rule most in vogue is that *that* is to be applied only when the purpose of the relative clause is to limit or define the thing meant. Undoubtedly, for this purpose, its use is in general preferable to the use of *who* or *which*. It is easier and more idiomatic to say, 'All the men that had blue eyes,' than, 'All the men *who*,' etc. Besides, *that* so employed often avoids ambiguities that would attend *who* or *which*; e.g., 'His conduct surprised his English friends, *who* had not known him long.' This may mean either that his English friends generally were surprised, for the reason that they had not known him long, or that only a portion of them — those, namely, that had not known him long — were surprised. If the latter is the meaning intended, it would remove all ambiguity to write: 'His English friends *that* had not known him long.'

The use of the demonstrative *that* as a relative is common to the Teutonic languages, but is unknown in Greek, and Latin, and in the Romanic languages. The relatives proper (and the many derivatives and compounds formed from them) in all the allied languages begin with *h*, or an equivalent of *k* (*qu*, *hw*, *hv* = *wh*, *w*, *hu*. Skr. *kas*, Gr. *kos* or *pos* (how), Lat. *quis*, *qui*, Pol. *kto*, Goth. *hwas*, Ger. *wer*, Dan. *hvi* pron *vi*, Eng. *who*, *how*, Fr *qui*, It. *chi*.

The relatives proper are used also (sometimes with a slight variation of form) to ask questions, when they are called Interrogatives.

RELAX, v. *ré-laks'* [L. *relaxāre*, to relax, to unbend — from *re*, back; *laxo*, I loose or slacken — from *laxus*, loose F. *relascher*; It. *rilassare*]: to loosen; to make less rigid or tense, as sinews or strings; to make less rigorous or strict; to mitigate, to relieve from close attention; to unbend; to grow slack or feeble, as in study or efforts; to abate in severity; in *OE.*, to open; to loose. RELAX'ING, imp.: ADJ. tending to relax or weaken, as climate. RELAXED', pp. *-lakst*. RELAXATION, n. *rē'laks-ā'shun* [F. -L.]: the act of slackening or remitting tension; the act of recreating one's self; recreation; abatement of rigor or severity, as of

the law; an opening or looseness: in *med.*, a lessening of the normal and healthy tone of the body. RELAXATIVE, a. *rē-lăks'ă tĭv*, having the quality of relaxing.—SYN. of 'relax': to slacken; remit; release; ease; divert; be remiss; loose; abate; mitigate; unbend; recreate.

RELAY, n. *rē-lā'* [F. *relais*, a relay: It. *rilasso*, a relay of horses: F. *relayer*, to relieve another by undertaking his task—from L. *re*, again; OF. *layer*, to discontinue, to stop: Goth. *letan*, to allow: or perhaps connected with L. *laxāre*, to loosen (see RELAX)]: a supply of fresh horses in readiness to relieve others, that the traveller may proceed without delay; a supply of dogs at certain points for the pursuit of game; a device in telegraphy for sending on the current with fresh strength.

RELAY, v. *rē-lā'* [*re*, and *lay*]: to lay again or a second time.

RELEASE, v. *rē-lēs'* [OF. *relaisser*, to relinquish: F. *laisse*, a string, a leash—from mid. L. *laxa*, a string loosely held: L. *laxus*, loose: It. *rilasciare*, to release, to set at liberty (see RELAX)]: to set free from restraint or suffering of any kind: to let go; to free from obligation or penalty: N. a setting free from any claim, obligation, pain, or restraint; in *law*, discharge of some interest in land or of some legal right; also discharge of all demands or rights of action concerning a particular matter (see QUITCLAIM): acquittance. RELEAS'ING, imp. RELEASED', pp. *-lēst'*. RELEAS'ER, n. *-ĕr*, one who releases. RELEASE'MENT, n. *-mĕnt*, the act of releasing from restraint or obligation —SYN. of 'release, v.': to quit; let go; relax; slacken; free; liberate; discharge; loose.

RELEGATE, v. *rĕl'ē gāt* [L. *relegātus*, banished—from *re*, back or again; *legāre*, to send with a legal commission]: to dispatch; to send into exile; to banish. REL'EGATING, imp. REL'EGATED, pp. REL'EGA'TION, n. *-gā'shŭn*, exile; judicial banishment.

RELENT, v. *rē-lĕnt'* [L. *relentescĕre*, to grow slack again—from *re*, again; *lentesco*, I become pliant; *lentus*, pliant: F. *ralentir*: It. *rallentare*, to slacken]: to become less rigid or hard; to become more mild and tender; to feel compassion; in *OE.*, to slacken; to remit; dissolve: N. in *OE.*, stay; remission. RELENT'ING, imp.: N. the act of becoming mild or tender; the growing less intense. RELENT'ED, pp. RELENT'LESS, a. *-lĕs*, destitute of pity or compassion; unmerciful; unforgiving; cruel. RELENT'LESSLY, ad. *-lĭ*. RELENT'LESSNESS, n. *-nĕs*, the quality of being unmoved by pity. RELENT'MENT, n. *-mĕnt*, the act of relenting; pity; compassion.—SYN. of 'relent': to soften; give; melt; mollify.

RELESSEE, n. *rē'lēs-sē'* [*re*, again, and *lessee*]: the person in whose favor a re-lease is executed. RE'LESSOR', n. *-sŏr'*, the person who executes a re-lease.

RELET, v. *rē-lĕt'* [*re*, again, and *let*]: to let again, as a house.

RELEVANT, a. *rĕl'ē-vant* [L. *relevans, relevantis* or *relevatus*, lifting or raising up, relieving; *relevare*, to lighten—from *re*, again; *levis*, I make light: F. *relevant*, raising again: It. *rilevante*, important, material]. applicable; pertinent; suitable. RELEVANCE, n. *-vans*, or RELEVANCY, n. *-vansi*, state of being relevant: in *Scotch law*, sufficient to support the cause.—An objection to the relevancy, corresponding somewhat to a *demurrer*, in other systems.

RELIABLE, a. *rē-lī'a-bl* [*re*, back or again, and *liable*—(see RELY)]: that may be relied on or trusted; trustworthy. RELIABLY, ad. *-bli*. RELIABLENESS, n. *-bl-nĕs*, the state or quality of being reliable. RELIANCE, n. *-ans*, trust; confidence; dependence. RELIANT, a. *-ant*, confident; trusting.

RELIC, n. *rĕl'ik* [L. *relictus*, left behind; *reliquiæ*, remains—from *re*, back or again; *linquo*, I leave or forsake: It. *reliquia*: F. *relique*] that which is left after the loss or decay of the rest. RELICS, n. plu. *-iks*, the body of a deceased person, or part of it, also the garments or parts of them: anything preserved in remembrance: see RELICS, ETC., below.

RELICS, in Theological and Historical Nomenclature: memorial objects having some connection, direct or indirect, with the persons of those now departed from this life who were eminent for sanctity or for services. Under the same name are classed certain objects believed to be memorials of the life of the Lord Jesus on earth, especially of his passion and death. R. of the distinguished dead have at all times and in all states of society, however rude, been held in honor. But the question as to R. is important in relation chiefly to Christian history, in which the name is restricted to a single class of such memorials, viz., to objects which derive their value from their connection with the Lord Jesus and with the saints: e.g., fragments of Christ's cross or crown of thorns; portions of the dust, the bones, the blood, the instruments of torture, the chains, etc., of the martyrs; mortal remains, clothes, books, and other objects of personal use of the other saints; and even objects to which a certain indirect sacred interest is given by their being brought into contact with the direct memorials of the distinguished dead; e.g., by their being placed on the tombs of the martyrs, touched with the relics, or blessed at the shrine or sanctuary of the saints, etc. In all such cases, the motive of religious honor, however differently it arises, is the same, viz., the association of the object which is honored with the personage whose virtues or services are the subject of grateful veneration. The merits of R. in their theological aspect, are beyond the scope of this publication. We confine ourselves to an outline of the history of the veneration of R., and to a statement of the conflicting views of rival Christian communions on the subject.

The earliest monuments of Christian history contain evidences of the deep and reverential affection with which martyrs of the faith, their mortal remains, and everything connected with their martyrdom, were regarded by their fellow-Christians: for which reverence Rom. Catholics pro-

fess to find warrant in many passages of the Old and New Test.; e.g., Ex. xiii. 19; Deut. xxxiv. 6; II K. xiii. 21, and xxiii. 16–18; Is. xi. 10; Matt. ix. 20–22; Acts v. 12–16, and xix. 11, 12. The contemporary letter of the Church of Smyrna attests this plainly as to the martyrdom of Polycarp; Pontian's *Life of Cyprian* tells of their stealing the martyr's body, and carrying it away by night in holy triumph with lights and torches. At an early period, too, miracles are described as connected with relics. Thus Ambrose (Ep. xxii. 1, 2) tells of a blind man's sight restored by his touching the bodies of the martyrs Gervasius and Protasius; and similar wonders are detailed by Gregory Nazianzen (*Orat.* xviii.), Chrysostom (*In S. Ignatium*, n. 5), Leo the Great (*Serm.* iv. 4); insomuch that the possession of R. of the martyrs, and even the occasional touching of them, was regarded as a special happiness (Gregory Naz. *Orat. in S. Theodorum*), and that not merely individuals, but, according to Theodoret the historian, even cities were content to share with each other portions of the sacred treasure (Theodoret, *Grac. Affectionum Curatio*, disp. viii.). Connected with this feeling, too, is found a belief of a certain sacred efficacy in the presence or the touch of the R.; especially there is ascribed by Chrysostom, Basil, Theodoret, and other Fathers, to prayers offered before the R. a virtue in dispelling or warding off sickness, diabolical machinations, and other evils. Hence we find that altars were erected over the tombs of the martyrs, or at least that R. were invariably placed on the altars, wherever erected, insomuch that the Trullan Council ordered the demolition of all altars in which no R had been deposited. Far more sacred than the R. of martyrs, was the cross of the Lord Jesus, which was believed to have been discovered at Jerusalem by Helena (q.v.), mother of Emperor Constantine. Minute portions of the wood were distributed to the principal churches; and Cyril of Jerusalem, within less than a century after the discovery of the cross, describes the precious wood as dispersed throughout the world. It must be added, too, that even at this early period, many abuses and superstitions had crept in, which even the Fathers who admit the worship do not fail to condemn.

The practice of venerating R., however, and the feeling on which it was founded, were not suffered to pass without a protest. Vigilantius, in a treatise now lost, but whose tenor is learned from his adversary, Jerome, reprobated in the strongest terms the excesses to which it was carried, and indeed the essential principles on which the practice rests. But the protest fell without drawing an echo from the contemporary mind. Vigilantius had so few followers, that were it not for the refutation composed by Jerome of his work against R., we should have no record of his opposition to the popular view; and it is urged by Rom. Catholics, as a proof of the universal acquiescence of the church of the 4th c. in the practice of venerating R., that in an age remarkable for intellectual activity and for polemic ardor—an age which in 25 years saw nearly 30 councils in reference to the Pelagian heresy—it was not even

found necessary to call a single council to condemn Vigilantius.

The writings of Augustine, of Paulinus of Nola, of Ephrem the Syrian, of Gregory the Great, and others, are full of examples of the miraculous virtue ascribed to R., and of the variety and the extensive multiplication of sacred memorials of all kinds. Nor was this confined to the orthodox alone; all the different parties in the controversy on the Incarnation agreed with Rom. Catholics and with one another on this subject; and even the Iconoclasts, at the very time that they most fiercely repudiated the use of images, admitted without difficulty the veneration of relics.

In the age of the Crusades, fresh impulse was given to this practice in the West, by the novelty and variety of the sacred objects brought home from the churches of Syria, Asia Minor, and Constantinople by crusaders, by palmers returning from Palestine, and by the Latin conquerors of Constantinople; and it is admitted by the most zealous Rom. Catholics, that at this period many false, and perhaps even absurd and ridiculous R were introduced and were successfully commended to the veneration of individuals or invididual churches in the West; nor do they venture to doubt that abuse and superstition found their way side by side with what they regard as the genuine and authorized religious veneration. Nevertheless, except with the Waldenses, Wycliffe, and a few isolated individuals, the practice remained unchallenged till the 16th c., when, in common with many other doctrines and practices of the Church of Rome, it was utterly repudiated by the Reformers. Rom. Catholics, however, allege that the practice, as sanctioned by the church, has nothing in common with the abuses which form the main ground of the objections alleged by Protestants. The Rom. Cath. use of R., as authorized by the church, is to serve as incentives to faith and piety, by recalling vividly to men's mind the lives, and, as it were, the corporeal presence and the earthly converse of the saints and thus placing before men, in a more touching manner, the virtues which, in the examples, are held up for imitation. The decree of the Council of Trent connects this subject of R. veneration with the question of the veneration of the saints, and regards the R. of the saints not as possessing intrinsic virtue, but only as instruments 'through which God bestows benefits on men': see INVOCATION OF SAINTS.

The Greek and other oriental churches, and most of the oriental sects, agree with Rom. Catholics in the practice of honoring R. of saints.

On the other hand, the Reformed churches, without exception, have rejected the usage as unscriptural, tending by its nature to withdraw from the worship of the one God, and further deformed by numerous superstitions. They regard a large proportion of the R. which Rom. Catholics venerate as false and suppositious; and they specify several, regarding whose spuriousness even learned Rom. Catholics appear assured. Some R. have been

the subject of much controversy among Rom. Catholics themselves: see HOLY COAT: HOLY PLACES: LORETO PILGRIM. It may be added that the practice of venerating R. forms a notable feature of the Mohammedan usage of pilgrimages. The holy cities of Mecca and Medina, and the celebrated Mosque of Omar at Jerusalem, owe most of their holiness in Mohammedan eyes, to the memorials of the Prophet, and other R. which they contain; and the celebrated *Sanjak sherif* or Sacred Standard at Constantinople, is believed to be formed of the nether garment of Mohammed. The practice occupies a still more important place in Buddhism (q.v.—see also CEYLON).

RELICT, n. *rĕl'ĭkt* [L. *relictus*, left behind—from *re*, back or again; *linquo*, I leave: OF. *réliete*, a widow]: a woman whose husband is dead; a widow. RELICTED, a. *rē-lĭkt'ĕd*, in *law*, left bare, as land by the receding water. RELIC'TION, n. *-shŭn*, land left bare by water.

RELIED: see under RELY.

RELIEF, n. *rē-lēf'* [F. *relief*, relief—from L. *relevārĕ*, to lighten, to raise or lift up—from *re*, back or again; *lĕvō*, I make light: It. *rilevare;* F. *relever*, to raise again]:

High Relief.

removal in whole or in part of any evil, grievance, or affliction; that which mitigates; help; succor; remedy; release of a sentinel from his post; in the *feudal law*, a payment made to the lord by the tenant or vassal on coming

Low Relief.

into possession of an estate to be held under him: in *fort.*, the projection or prominence of a work above the ground-plan; in the *fine arts*, the appearance of projection in painting; in *sculp.*, the projection of figures from the ground or plane on which they are formed, being of three kinds—ALTO-RELIEVO, or high relief; MEZZO-RELIEVO, medium or demi-

relief; Basso-relievo, or low relief (see Alto-rilievo, Sculpture: see also Relievo). Relief-valve, in a *steam-engine*, a valve through which the water escapes into the hot well when shut off from the boiler. Relieve, v. *rē-lēv'*, to set free in whole or in part, as from any pain of body or distress of mind, or any evil; to mitigate; to alleviate; to help, to succor; to release, as from a post or duty. Relieving, imp.. Adj. abating the violence of, as pain or distress; serving or tending to relieve. Relieved, pp. *rē-lēvd'*. Relievable, a. *rē-lēv'a-bl*, capable of being relieved. Reliever, n. *-er*, one who or that which relieves. Relieving-officer, in *England*, an officer under a poor-law board, to whom paupers apply for assistance, and who inquires into the facts of their situation, visiting their abodes, relieving cases of urgent need, and keeping a register of cases. Syn. of 'relief': mitigation; assistance; redress; alleviation; help; aid; indemnification; remedy; succor;—of 'relieve': to succor; assist; free; remedy; indemnify; remove, assuage; alleviate; help; support; ease; mitigate; sustain; diminish, lighten; redress.

RELIEF CHURCH: see United Presbyterian Church.

RELIEVO, n. *rē-lē'vō* [It.]: see under Relief. *Note.*—Relievo is the usual but erroneous spelling for Rilievo.

RELIGHT, v. *rē-līt* [*re*, again, and *light*]: to light anew; to rekindle.

RELIGIEUX, n. *rē-lezh'yŭ* [F.—from L. *religiosus*, fearing the gods, devout (see Religious)]: a monk, a friar. Relig'ieuse, n. *-ēz*, a nun.

RELIGION, n. *rē-lij'un* [F. *religion*—from L. *religiōnem*, reverence for the gods, piety—from *re*, again; *ligō*, I bind: derived by others from L. *relegĕre*, to go over again in thought—from *re*, again; *legĕre*, to read: It. *religione*, religion]: that obligation or sense of duty which rests on the minds of men, arising from the felt relation in which they stand to an almighty power; belief in God, with a sincere desire to do His will; godliness; any system of faith or worship; religious rites. RELI'GIONLESS, a. *-les*, without religion. RELI'GIONIST, n. *-ist*, one who talks much on religious subjects, but has little devotional feeling; a sectarian bigot. RELI'GIONISM, n. *-izm*, adherence to religion, or practice of it; appearance of religion. RELI'GIOUS, a. *-us* [L. *religiosus*, pious, devout]: of or relating to religion; loving and obeying God; pious; devout; bound by vows; teaching or containing religion: N. one bound by monastic vows; a monk; a nun. RELI'GIOUSLY, ad. *-li*, piously; reverently; with strict observance. RELI'GIOUSNESS, n. *-nes*, the quality or state of being religious. RELIGIOUS ORDERS (see MONACHISM). SYN. of 'religious': godly; devout; devotional; pious; holy; strict; rigid; exact; conscientious.

RELIGION: moral and spiritual element in the character of a man: also, a system of beliefs, doctrines, and rites. These two must be distinguished from each other. The former—R. of personal character, R. in its psychological aspect, or subjectively considered—is specially in the province of the philosophy of R.; while the various forms of faith, historically and objectively treated, constitute the field of comparative religion. But though these branches are to be distinguished, neither can be fairly treated apart from the other; and both are included under the Science of Religion.

The inquiries which collectively constitute the Philosophy of R. have been prosecuted zealously since Kant gave new life to philosophical speculation; but since then, as before, conclusions have widely differed as to what is the essence of R. as a factor in human thought and character. By some, R. has been regarded as identical with morality; others have treated it as mainly, if not solely, intellectual adhesion to a certain body of dogmas; while its emotional nature has seldom lacked assertors. It is evident that the philosophical definition of the essence of R. will take hue and shape from the definer's own practical experience, or at least from his own actual observation, of what R. is and does.

Kant made R. a moral development, and defined it as 'the recognition of all our duties as divine commands,' as of eternal obligation, and not as merely imposed by authority or custom. Fichte denied the practical character of R., and identified it, at least in some of his writings, with a higher form of speculative knowledge, 'which makes man clear to himself, and answers the highest questions that can be asked.' Elsewhere in Fichte, it is the recognition of God as manifested in us. Schleiermacher, one of the greatest names in the history of modern theology and religious spec-

tation, expressly denied that R. was either theoretical knowledge, practical, ethical activity, or any mixture of these, and relegated it to the sphere of feeling, of emotion. His most famous definition, more one-sided than his view of R. ultimately was, made it consist in our consciousness of absolute dependence on something which, though it determines us, we cannot determine in turn. Hegel, protesting vehemently against this view, proclaimed R. to be perfect freedom; and taught that, passing through various stages, it is finally the divine spirit becoming conscious of itself through the finite spirit—again an intellectual process. Comte glorified R., the R. of humanity, as reverence for and worship of the spirit of mankind. Feuerbach degraded R. to a result of self-love and egoism.

R., on its subjective side, is doubtless in its essence mainly of the nature of emotion; but it is not merely emotion. In it are combined awe, reverence, hope, fear, love; but these feelings point to an object which in all developed religions is the unseen, the infinite, God, who is a Spirit. With the feelings cardinal to the existence of R. are accordingly bound up certain beliefs as to the being and character of God, our relation to Him and His relation to the world and history, views of the nature of the soul, of the creation of man, of Divine providence. Also there are associated with these beliefs modes of worship, or forms of ritual for expressing man's reverence. Thus R., as piety, faith, connects itself with creed and ritual, and assumes objective shape as a system of doctrine, in profession to which multitudes may unite. Beliefs reverently and confidently cherished react on practical life, and become a guide to conduct. R., accordingly, influences a man as intellectual, ethical, and emotional, and if really cherished, has a correspondingly deep hold on his life.

As above noted, the definitions of R. may be very various. To the Christian disciple, R. in its essence is the following of God by a man as the child trusts, obeys, and imitates its father; and if occasion required an enlargement of this rudimentary definition it would be in this general direction—that this trustful and loving obedience arises in man in view of some manifestation which God has made of Himself in human history, and within man's own soul, through His Son Jesus the Christ, and by His Holy Spirit. This definition, though evidently framed in view of the Christian R., is yet capable of application essentially to the R. of any devout soul—even of a conscientious pagan if seeking light, and meanwhile acting according to such outward or inward light of God as he may possess.

Origin and Growth of Religion and Religious Systems.—R. is as old as human history or human language; and there is good reason for saying that it is universal, though there are and have been individual atheists and communities with little sense of religion. The temperament of certain races renders them more highly susceptible of profound religious impressions than others, and more open to religious impulses, just as some individuals have a deeper fund of religious feeling, of piety, and reverence, than their neighbors.

Most of the great religions profess to have been directly revealed to man by inspiration from God; and are thus miraculously communicated to man, who has only to hear, understand, and obey. Thus man himself contributes nothing to the religious system, which may, however, be revealed to him only by degrees, and be apprehended fully only by the remote descendants of those to whom its first truths were made known. The revelation may be completed within a certain period (as Protestants generally hold of their faith), or there may be a measure of permanent and progressive revelation (as Rom. Catholics believe).

On the other hand, many inquirers seek the origin of R. within man himself; and it is claimed that it is not necessary that those who do so should deny the truth of all religions, or reject belief in an almighty and infinite God. Acceptance of a naturalistic theory of the *growth* of R. in man may not necessarily imply negation of the supernatural; on the other hand, acceptance of the supernatural view may not necessarily declare that truths as to God naturally developed are therefore not truths. Still it is not evident what is gained for truth by excluding God from the origin of any of the higher moral activities of man's soul; nor indeed is it yet proved that such exclusion is possible if God be the father of men.

It has been usual to regard the very lowest form of R. as the beginning of any and every R., or of all religions save that of the theorizer. Thus *fetichism* would be the original root of all or most religions, and be followed by the various forms of polytheism, higher and lower. Nature worship is an earlier form of belief than that in which the gods are regarded as persons with minds, wills, characters, perchance bodies, more or less like those of men. The richest mythologies belong to the anthropomorphic stage. From some polytheistic creeds, again, monotheistic faiths have sprung. Comte alleges that all knowledge has passed through three stages: one religious or theological, in which unseen causes are regarded as divine; then a philosophical stage; then the final or positive one.

On the other hand, careful investigators of old faiths such as Max Müller, not only assert that no R. consists of fetichism only, but hold fetichism to be not a primary, but a degraded form of faith; for there certainly is retrogression in R. at certain times among certain peoples, as well as development. Guided by the old Indian faith and its records, Max Müller teaches that R., which he regards as the faculty (or the exercise of the faculty) for apprehension of the infinite, was never entirely sensuous. Man, by the use of his senses, was brought into contact with incalculable powers and was moved to awe by the non-finite, the infinite. This infinite power he saw first—not in tangible objects, as stones, shells, etc.—but in what Müller calls semi-tangible, e.g. mountains, trees, rivers; and later, in wholly intangible objects, as the sky, the stars, the sun, the moon, the dawn. From worshipping such powers of nature, men later came to worship invisible deities, manifesting various powers. Ideas of law, virtue, infinitude, and immortality

were awakened. The belief in *Deus*, or single supreme beings, which Müller calls *Henotheism*, led naturally to belief in some one God presiding over the other gods, now no longer regarded as supreme, to *Polytheism*; or to something like *Monotheism*, a belief in one God, excluding the possibility of other gods. In some, the disbelief in the many gods led to atheism; or in others, to Buddhism. This development, Max Müller thinks, is well marked in the thought of India. Among other races the growth of belief has doubtless been to a greater or less extent different, but the case of India is, for various reasons, specially suggestive.

The Faiths of the World.—The principal creeds and forms of faith are separately treated in this work: the more important titles are here noted for further reference. On the non-Christian religions ancient as well as modern, there are the relevant paragraphs under the titles Assyria, Egypt, India, Japan etc.; independent titles—Vedas, Sanskrit Literature, Sikhs, Jainas, Zoroaster, Zend Avesta, Parsees; Roman Religion, Greek Religion; Scandinavian Mythology; Buddhism; Confucius; Lao-tsze; Mohammedanism, etc. For Christian systems—Christianity; Roman Catholic Church; Greek Church; Anglo-Catholic Church; Congregationalism; Presbyterianism; Episcopacy; Lutherans; Church of Scotland; Baptists; Methodists; Universalists; Unitarians; and many other titles referred to in these or suggested by them. See also GOD; CHRIST; HOLY SPIRIT; REVELATION; INSPIRATION; BIBLE; CHURCH; ETC.—The relation to Christianity of Mormons, Shakers, and followers of Joanna Southcott, is debated. Subjects of religious speculation are presented under such titles as Fetichism, Anthropomorphism, Pantheism, Materialism, Secularism, Myth and Mythology.—The numerical relations of the adherents of the several faiths in various countries is indicated, when possible, in the article on each country.

The following is a morphological classification of religions (from *Encyc. Britannica*, 9th ed.):

I. NATURE RELIGIONS.

(*a*) Polydemonistic Magical Religions under the control of Animism (q.v.).

To this class belong the religions of the so-called savages or uncivilized peoples.

(*b*) Purified or organized Magical Religions. Therianthropic Polytheism.

1. *Unorganized.*	2. *Organized.*
Japanese Kami-no-Madsu.	The semi-civilized religions of America: Maya, Natchez, Toltecs-Aztecs, Muyscas, Incas in Peru.
The non-Aryan (Dravidian) religions of India, principally in the Deccan.	The ancient religion of the Chinese Empire.
Religion of the Finns and Ehsts.	Ancient Babylonian (Chaldæan) religion.
The old Arabic religions.	Religion of Egypt.
Old Pelasgic religion.	
Old Italiote religions.	
Etruscan religion before its admixture with Greek elements (?).	
The old Slavonic religions.	

(c) Worship of manlike but superhuman and semi-ethical beings. Anthropomorphic Polytheism.

The anc. Vaidic (Vedic) religion (India).
The pre-Zarathustrian Iranic religion (Bactria, Media, Persia).
The younger Babylonian and Assyrian religion.
The religions of the other civilized Semites (Phœnicia, Canaan, Aramæa, Sabæans in s. Arabia).
The Celtic, Germanic, Hellenic, and Græco-Roman religions.

II. Ethical Religions.

(a) National Nomistic (Nomothetic) religious communities.

Taoism and Confucianism in China.
Brahmanism, with its various anc. and modern sects.
Jainism and primitive Buddhism.
Mazdaism (Zarathustrianism), with its sects.
Mosaism.
Judaism.

(b) Universalistic religious communities.

Islam, Buddhism, Christianity.

A wide discrepancy is found in the estimates by recognized authorities of the number of believers in the different creeds of the world, but the following are considered the best estimates (1896): Christianity, 477,088,000; Buddhism, 147,900,000; Mohammedanism, 176,850,000; Brahmanism, 190,000,000; Confucianism, 250,000,000; Shintoism, 14,000,000; Judaism, 7,000,000; Taoism, 43,000,000; Polytheism, 115,000,000.

RELIGIOUS DIVISIONS OF EUROPE.

Countries.	Catholic Church.	Protestant Chs.	Greek Church.	Jews.	Mohammedans.
Russia	9,600,000	3,400,000	73,310,000	3,400,000	3,000,000
Germany	17,100,000	29,478,000	.....	590,000	.....
Austria-Hung'y	31,100,000	3,900,000	3,100,000	1,500,000	.....
France	35,387,000	580,000	.....	49,000	.....
Unit'd Kingdom	6,500,000	30,100,000	.....	100,000	.....
Italy	29,850,000	62,000	.....	38,000	.....
Spain	16,850,000	29,000	.....	5,000	.....
Belgium	5,880,000	15,000	.....	3,000	.....
Roumania	100,000	15,000	4,800,000	400,000	30,000
Ottoman E'pire	320,000	11,000	1,700,000	60,000	2,708,000
Netherlands	1,545,000	2,756,000	.....	83,000	.....
Portugal	4,300,000	.....	.....	.....	.....
Sweden	1,000	4,698,000	.....	2,000	.....
Switzerland	1,172,000	1,710,000	.....	8,000	.....
Denmark	3,000	2,089,000	.....	4,000	.....
Greece	10,000	10,000	1,930,000	5,000	45,000
Servia	6,000	1,000	1,973,000	5,000	15,000
Bulgaria	29,000	.....	1,293,000	.....	571,000
Norway	1,000	1,958,000	.....	.....	.....
Roumelia	30,000	.....	700,000	4,000	240,000
Montenegro	5,000	.....	200,000	.....	.....
Luxemburg	200,000	.....	.....	.....	.....
Malta	160,000	.....	.....	.....	.....
Gibraltar	16,000	.....	.....	.....	.....
Total	160,165,000	80,812,000	89,196,000	6,456,000	6,629,000

According to the special publication of the United States census office on Churches, giving the revised statistics for the census year 1890, there were 143 distinct denominations besides several independent and unassociated congregations. Arranged in the order of the number of communicants, these denominations ranked as follows:

1. Rom. Cath. 6,231,417
2. Meth. Epis. 2,240,354
3. Reg. Bapt. 1,348,989
4. Reg. Bapt. S. 1,280,066
5. Meth. Epis. S. 1,208,776
6. Reg. Bapt. N. ..... [illegible]
7. Pres. N. ..... [illegible]
8. Pres. of U. S. ..... [illegible]
9. Prot. Episc. ..... [illegible]
10. Congl. ..... [illegible]
11. Af. M. E. 452,725
12. Luth. Syn. Con. 357,153
13. Af. M. E. Zion 349,788
14. Luth. Gen. Coun. 324,846
15. Ref. in U. S. ..... [illegible]
16. United Breth. in C. 202,474
17. Ger. Evan. Syn. 187,432
18. Presb. S. 179,721
19. Cumber. Presb. 164,940
20. Luth. Gen. Syn. 164,640
21. Lat.-day Saints 144,352
22. Meth. Prot. 141,989
23. Evang. Assoc. 133,313
24. Col'd M. E. 129,383
25. Un. Norweg. Luth. 119,972
26. Prim. Bapt. 116,271
27. Unit. Presb. 94,402
28. Ref. in America 92,970
29. Christian 90,718
30. Freewill Bapt. 87,898
31. Friends, Orth. 80,655
32. Jewish, Ref. 72,899
33. Luth. Syn. of O. 69,505
34. Unitarian 67,749
35. Dunkards, Con. 61,101
36. Jewish, Orth. 57,597
37. Norweg. Luth. 55,452
38. Universalist 49,194
39. Spiritualist 45,030
40. Luth. Unit. Syn. 37,457
41. Ger. Evan. Prot. 36,156
42. Seventh-day Adv. 28,991
43. Adv. Christian 25,816
44. Unit. Breth., Old C. 22,807
45. Ch. of God 22,511
46. Free Meth. 22,110
47. Friends, Hicks 21,992
48. L.-d. S., Reorgan. 21,773
49. Gen. Bapt. 21,362
50. Christ. Union 18,214
51. Mennonite 17,078
52. Wesley. Meth. 16,492
53. Hauges Luth. Syn. Ind. Congregations 14,730
54. Russian Orth. 14,126
55. Unit. Bapt. 13,504
56. Christian, S. 13,209
57. Cum. Presb., col'd 13,004
58. Old Two-seed Bapt. 12,956
59. Welsh Calvin. Meth. 12,851
60. Christian Ref. 12,722
61. Orig. Freew. Bapt. 12,470
62. Moravian 11,864
63. Mich. Luth. Syn. 11,781
64. Gr. Cath. (Uniates) 11,482
65. Ref. Presb. Syn. 10,850
66. Danish Luth. Ch. 10,574
67. Amish Mennon. 10,181
68. Seventh-day Bapt. 10,101
69. Congl. Meth. 9,143
70. Salvation Army 8,765
71. Christ. Science 8,742
72. Assoc. Ref. Syn., S. 8,724
73. Ref. Episc. 8,501
74. Bapt. Ch. in C. 8,455
75. Dunkards, Pro. 8,254
76. New Jerusalem 8,089
77. Augsb. Luth. Syn. 7,995
78. Gen. Con. Mennon. 7,010
79. Imman. Luth. Syn. 5,679
80. Prim. Meth. 5,580
81. Ref. Presb. Gen. Syn. 4,764
82. Dunkards, Old O. 4,602
83. Friends, Wilbur 4,411
84. Buffalo Luth. Syn. 4,329
85. Dan. Luth. Assoc. 4,242
86. Af. Un. M. P. 3,493
87. Ch. of God Adv. 3,415
88. Breth. in Christ 2,872
89. Ind. Meth. 2,688
90. Plym. Breth. II. 2,569
91. Zion Un. Apostolic. 2,419
92. Plym. Breth. I. 2,346
93. Un. Amer. M. E. 2,289
94. Old Amish, Mennon. 2,279
95. Iceland. Luth. Syn. 2,038
96. Shaker 1,991
97. Ref. Mennon 1,728
98. Amana Soc 1,655
99. Separate Bapt 1,600
100. Cath. Apostolic 1,599
101. Bundes Confer 1,394
102. Suomai Luth. Syn. 1,388
103. Christadelphian 1,385
104. Plym. Breth. III. 1,277
105. Evang. Adv. 1,235
106. Breth. Christ. Mennon 1,147
107. Ethical Culture 1,113
108. New Congl. Meth. 1,064
109. Assoc. of N. A. 1,059
110. Life and Adv. Union 1,053
111. Ref. Cath 1,018
112. Evang. Mission 1,000
113. Six-Prin. Bapt. 951
114. Social Breth. 937
115. Defenseless Mennon. 913
116. Christ. Mission Ass. 856
117. Plym. Breth. IV. 754
118. Theosophist 718
119. Old Catholic 695
120. Ch. of God (Adv.) 665
121. Old (Wis.) Mennon. 647
122. Ref. Presb. in U. S., etc. 610
123. Unit. Zion's Children 600
124. Ch. of G. in Christ 525
125. Ch. Triumphant 471
126. Bruederhoef 384
127. Fr'nds of the Temple 352
128. Armenian Cath. 340
129. Congl. Meth., col'd 335
130. Schwenkfeldians 319
131. Harmony Soc. 306
132. Friends, Prim. 250
133. Yorker Breth. 232
134. Apostol. Mennon. 214
135. Koreshan Ecclesia 209
136. Separatists 205
137. Seventh-d. Bapt. Ger. 200
138. Greek Orth. 194
139. Ref. Pres. Covenant. 100
140. Altruist 37
141. New Icaria 25
142. Adonai Shomo 21
143. Chinese temples, no members reported. 20

SUMMARY OF DENOMINATIONS, BY STATES AND TERRITORIES.

States and territories.	Organizations	Churches and halls	Value church property.	Members.
Alabama	6,383	6,402	$6,768,499	559,171
Alaska	26	36	203,650	14,852
Arizona	131	122	270,816	26,972
Arkansas	4,874	4,719	3,266,663	296,208
California	1,596	1,930	11,961,914	280,619
Colorado	647	655	4,743,317	86,837
Connecticut	1,149	1,267	16,985,036	309,341
Delaware	382	427	2,708,825	48,679
District of Columbia	217	241	6,313,625	94,203
Florida	1,971	2,038	2,424,423	141,734
Georgia	6,899	7,256	8,228,060	679,051
Idaho	247	240	281,310	24,636
Illinois	8,296	8,309	39,715,245	1,302,588
Indiana	6,480	6,487	18,671,131	693,860
Indian Territory	806	749	182,266	29,275
Iowa	5,539	5,509	16,056,786	556,817
Kansas	4,920	4,745	7,447,569	336,575
Kentucky	5,555	5,389	12,112,320	606,397
Louisiana	2,701	2,701	5,032,194	309,991
Maine	1,605	1,598	6,192,480	159,846
Maryland	2,328	2,465	15,445,946	379,418
Massachusetts	2,547	2,751	46,835,014	942,751
Michigan	4,708	4,701	18,682,971	569,504
Minnesota	3,429	3,368	12,940,152	532,590
Mississippi	5,186	5,255	4,390,173	430,557
Missouri	8,064	7,576	19,663,737	735,839
Montana	273	276	885,959	32,478
Nebraska	2,797	2,640	6,443,689	194,466
Nevada	64	64	208,225	5,877
New Hampshire	783	854	4,457,225	102,941
New Jersey	2,085	2,361	29,490,414	508,351
New Mexico	463	473	531,925	105,749
New York	8,237	8,684	140,123,008	2,171,822
North Carolina	6,824	6,788	7,077,440	685,194
North Dakota	868	786	780,775	59,496
Ohio	9,345	9,439	42,138,862	1,215,409
Oklahoma	129	99	61,575	4,901
Oregon	969	909	2,829,150	70,524
Pennsylvania	10,175	10,404	85,917,370	1,726,640
Rhode Island	402	434	7,583,110	148,008
South Carolina	3,815	4,068	5,636,236	508,485
South Dakota	1,589	1,466	1,761,275	85,490
Tennessee	6,350	6,325	9,885,943	551,673
Texas	8,766	8,454	8,682,332	677,151
Utah	427	437	1,493,791	128,115
Vermont	904	912	4,643,800	106,315
Virginia	4,998	5,228	10,473,943	569,235
Washington	892	889	2,408,625	58,798
West Virginia	2,989	2,911	3,701,483	189,917
Wisconsin	3,732	3,768	14,521,340	556,356
Wyoming	141	119	368,625	11,705
Totals	165,177	165,855	$679,630,139	20,612,806

SUMMARY BY DENOMINATIONAL FAMILIES.

Denominational families.	Ministers.	Churches*	Value church property.	Members.
Adventists (6 bodies)..	1,364	774	$1,236,345	60,491
Baptists (13 bodies)....	25,646	37,671	82,328,123	3,712,468
Breth., River (3 bodies)	155	70	81,350	3,427
Breth., Plym. (4 bodies)	.....	.....	1,465	6,661
Catholics (7 bodies)....	9,196	8,816	118,371,366	6,257,871
Catholic Apostolic....	95	3	66,050	1,394
Chinese temples.....	.....	47	62,000	.....
Christadelphians.....	.....	4	2,700	1,277
Christians (2 bodies)...	1,435	1,098	1,775,202	103,722
Christ. Mission Assoc..	10	11	3,900	754
Christian Scientists....	26	7	40,666	8,724
Christian Union.....	183	184	234,450	18,214
Church of God.....	522	338	643,185	22,511
Church Triumphant...	.....	.....	15,000	384
Church New Jerusalem	119	88	1,386,455	7,095
Communistic Socs. (8).	.....	40	106,800	4,049
Congregationalists....	5,058	4,736	43,335,437	512,771
Disciples of Christ. ...	3,773	5,324	12,206,038	641,051
Dunkards (4 bodies)...	2,088	1,016	1,362,631	73,727
Evangel. Assoc.....	1,235	1,899	4,785,680	133,313
Friends (4 bodies).....	1,277	965	4,541,334	107,208
Friends of the Temple	4	5	15,300	340
Ger. Evang. Prot.....	44	52	1,187,450	36,156
Ger. Evang. Synod....	680	785	4,614,490	187,432
Jewish Congs.(2 bodies)	200	301	9,754,275	130,496
Latter-day Saints (2)...	2,043	388	1,051,791	166,125
Luth. (16 bodies).....	4,591	6,701	35,060,354	1,231,072
Mennonites (12 bodies.	905	406	643,800	41,541
Methodists (17 bodies).	30,000	46,138	132,140,179	4,589,284
Moravians.....	114	114	681,250	11,781
Presb. (12 bodies)...	15,178	2,169	94,869,097	1,278,332
Protestant Epis. (2).	4,234	5,103	82,835,418	540,509
Reformed (3 bodies)...	1,506	2,080	18,744,242	309,458
Salvation Army.....	.....	27	38,150	8,742
Schwenkfeldians.....	3	6	12,200	306
Social Brethren.....	17	11	8,700	913
Soc. for Ethical Culture	.....	.....	.....	1,064
Spiritualists.....	.....	30	573,650	45,030
Theosophists.....	.....	1	600	695
United Brethren (2)..	2,108	3,415	4,937,583	225,281
Unitarians.....	515	424	10,335,100	67,749
Universalists.....	708	832	8,054,333	49,194
Ind. Congregations....	54	112	1,486,000	14,126
Totals.....	111,036	142,521	$679,630,139	20,612,898

* Exclusive of 23,334 halls and other places of worship.

SUMMARY OF COLORED ORGANIZATIONS.

DENOMINATIONS HAVING ONLY COLORED MEMBERS.

Denominations.	Organizations	Churches and halls	Value church property.	Members.
Regular Baptist	12,533	12,650	$9,038,549	1,348,989
Union American M. E.	42	42	187,600	2,279
African Meth. Episc.	2,481	4,155	6,486,280	452,725
African Union M. P.	40	40	54,440	3,415
African M. E. Zion	1,704	1,701	2,714,128	349,788
Congl. Meth	9	9	525	319
Colored Meth. Episc.	1,759	1,737	1,713,366	129,383
Zion Union Apostolic	32	28	15,000	2,346
Evangelist Missionary	11	12	2,000	951
Cumberland Presb.	224	217	195,826	12,956
Total	18,835	20,571	$20,389,714	2,303,151

COLORED ORGANIZATIONS IN OTHER DENOMINATIONS.

Regular Bapt., North	406	396	$1,087,518	35,221
Regular Bapt., South	7	7	3,875	651
Freewill Bapt.	5	5	13,300	271
Primitive Bapt.	323	324	135,427	18,162
Old-two-seed-in-the-Spirit Predestinarian Bapt.	15	15	930	2 265
Roman Catholic	31	30	237,400	14,517
Christ. Connection	63	61	23,500	4,989
Congl.	85	80	246,125	6,908
Disciples of Christ	277	258	176,795	18,578
Luth. Synod. Con.	5	5	13,400	211
Luth., Unit. Syn. in the S.	5	5	1,750	94
Meth. Episc.	2,981	2,965	3,630,093	246,249
Meth. Prot.	54	54	35,445	3,188
Ind. Meth.	2	2	4,675	222
Presb., North	233	221	391,650	14,961
Presb., South	45	36	22,200	1,568
Ref. Presb., Synod	1	1	1,500	76
Prot. Episc.	49	55	192,750	2,977
Ref. Episc.	37	37	18,401	1,723
Total	4,627	4,557	6,236,734	370,826
Grand total	23,462	25,128	$26,626,448	2,673,977

RELIGION, OFFENSES AGAINST: see BRAWLING IN CHURCHES: BLASPHEMY.

RELIGIOUS TRACT SOCIETY: society for promotion of religion by publication and circulation of religious tracts and small books. By far the most important Religious Tract Soc. in the world is that of London, founded 1799. There are now, indeed, numerous religious Tract Societies in different parts of the world, comparatively limited in their field of operations; this great Society reckoning many of them as its branches and auxiliaries. The advantage to the cause of religious truth by diffusion of tracts and pamphlets, was thoroughly appreciated at the time of the Reformation, but no society was formed for the purpose. In the 17th c., several traces are found of transient associations for printing and promoting the sale of religious works. The English 'Soc. for Promoting Christian Knowledge,' founded 1701, avowed, for one of its objects, 'to disperse, both at home and abroad, Bibles and tracts of religion.' In 1750, was formed in England 'The Society for Promoting Religious Knowledge among the Poor,' not, like the former, confined to the Church of England, but comprising Christians of all denominations, which published many tracts and books. The design of the Religious Tract Soc. of London, originated with George Burder, Congl. minister at Coventry, and among its founders were Rowland Hill, Matthew Wilks, and other eminent ministers. This great institution was founded on occasion of the annual meeting of the London Missionary Soc.

Its beginnings were humble, but it soon expanded, and its operations have extended over all parts of the world. It has printed and distributed books and tracts in 140 languages and dialects. The business of the Soc. is conducted by a committee chosen annually in London, consisting of four ministers, eight laymen, and ten trustees, half the number being members of the Church of England, and the other half Nonconformists. The Soc. has on its catalogue more than 4,000 separate publications for adults and many for children. It publishes *Leisure Hour* and *Sunday at Home*. In 1890-1 it circulated 73,259,000 copies of publications, and had total expenditures of about $1,000,000.

The first organization in the United States for publishing and circulating religious tracts and books, was the Meth. Book Concern, and its first book (1789) was Thomas à Kempis's *Imitation of Christ*. The Concern was moved from Philadelphia to New York 1804. A co ordinate Western Book Concern was established 1820, and became a separate corporation 1840. Its location is at Cincinnati. The last quadrennial report gives for the four years a total of tracts 6,856,500, and 2,171,330 vols., of which the S. School dept. counted about one-half; the German dept. under the western branch sold, during this period, publications to the amount of $500,200, an increase of $78,-443. The total sales of the Western Concern for eight years have been, exclusive of sales to depositories, $6,301,-897. The net earnings for the same period were $890,-880. The sales of both branches, eastern and western, for 1890–1894, aggregated $7,344,390. There is no colporteur system other than that incidental to the

work of the ministry and churches. The Mass. soc. for promotion of Christian knowledge was organized 1803, and did good work in its day.—In 1812 the Religious Tract soc. of New York was founded, and two years later, the New England Tract Soc., which, changing its name to American Tract Soc., removed from Andover, Mass., to Boston, 1823. In 1825 the American Tract Soc. was organized in New York, to include local societies, and the Boston soc. became auxiliary to it until 1859, when, after the memorable great debates at the May meetings in New York, caused by the elimination of anti-slavery doctrine from books by the New York soc., the Boston branch withdrew: since the extinction of slavery, it has again been merged practically in the Amer. Tract Soc. (New York), but like the Philadelphia branch, retains a corporate existence as inheritor of legacies. The Amer. Tract Soc. began its colporteur system 1842; the report 1895 gives 209 colporteurs (including 21 students in vacations), who gave 15,734 vols., sold 83,403, held 4,936 meetings, visited 98,060 families, found 14,420 families without religious books, and 5,827 Prot. households with no Bible. During the year, it had printed 975,000 Eng. tracts, and 421,000 in other languages (total 5,244,000 pages); 89,350 Eng. vols., and 29,700 other; and 1,615,000 copies of 6 periodicals, of which two are German. Its income from sales, rents, etc., was $208,477; from donations and legacies, $55,198; publication expenses, $174,818; amount for benevolent appropriations, $200,964. It has 6 distributing centres or agencies in as many great cities. One of these is the Western Tract Soc., at Cincinnati, which in addition circulated literature of its own to the value of $22,000.—The Presb. Publication Board during the year ending 1895, March, put forth 1,412,718 tracts and books, and 22,620,718 copies of periodicals.—The Amer. Baptist Publication Soc., 1895, reports 63 new publications, of which 362,250 copies were printed; the total number of copies of publications during the year, old, new, and periodical, was 34,914,810; receipts for the book department, $640,684; for the Bible department, $15,242; for the missionary department, $112,608.—Other denominations publish tracts and books, on a more limited scale, with more or less complete reports.

Objections are urged against the mode of operations, as interfering with the natural course of the book-trade, and checking free commercial enterprise; to which it has been always replied, that the diffusion of good and cheap books has increased the demand for them, and that thus the influence of the Soc. has been favorable to the book-trade in general. The answer, it is rejoined, seems inadequate, while certain members of the general publishing business complain of being encountered by a system of production, and sale to others than the poor—which leaves them no possibility of successful competition. That tracts distinctly religious *circulated* gratuitously or at a low cost among those too poor or too little interested to buy them, may exert a valuable influence for spiritual, moral, and social advancement is not to be disputed; and it is to be regretted

that among the immense mass of religious tracts issued in Great Britain and the United States, not a few by their exaggerated and mistaken views, not only of the facts of life but of the teaching of scripture, are liable to hinder the great cause which they are sincerely intended to serve.

RELINQUISH, v. *rē-ling'kwish* [L. *relinquo*, I leave behind—from *re*, back or again; *linquo*, I leave: It. *relinquere*: OF. *relinquir*, to relinquish; *relinquissant*, relinquishing]: to give up; to leave without the intention of resuming; to forsake; to abandon; to quit; to withdraw from. RELIN'QUISHING, imp. RELIN'QUISHED, pp. *-kwisht*. RELIN'QUISHMENT, n. *-ment*, a leaving or quitting without the intention of resuming; abandonment.—SYN. of 'relinquish': to abandon; forsake, desert, resign; leave; quit; forego; renounce; give up; depart from.

RELIQUARY, n. *rel'i-kwār-i* [F. *reliquaire*, a shrine for relics; mid. L. *reliquiarium*, a reliquary—from L. *reliquiæ*, remains: see RELIC]: small chest or casket in which relics are kept. Reliquaries are made of all kinds of materials, such as wood, iron, stone, ivory, silver, etc., and are frequently ornamented with costly jewels. Shrines are of the same description. That of the 'Three Kings,' at Cologne, has jewels valued at $1,200,000.

RELIQUE, n. *rēl'ik* [F.]: a relic—which see.

RELIQUIÆ, n. pln. *re-lik'i-ē* [L. *reliquiæ*, remains—from *re*, again; *linquo*, I leave]: remains of the dead; in *bot.*, the remains of withered leaves attached to the plant; in *geol.*, an organic remains whether animal or vegetable; in *med.*, the permanent evidence of past morbid processes.

RELIQUIDATE, v. *re-lik'wi-dāt* [*re*, again, and *liquidate*]: to liquidate anew. RELIQUIDATION, n. a renewed liquidation or adjustment.

RELISH, v. *rel'ish* [prov. F. *relicher*, to lick—from L. *re*, again, and OF. *lecher*; F. *lécher*, to lick: Gr. *leichō*, I lick or lap up: see also LICK]: to have a taste or liking for; to be gratified with the enjoyment or use of; to have a pleasing taste; to give an agreeable flavor to; to like the taste of; in *OE.*, to give pleasure. N. enjoyment of food in taste and flavor; something taken with food to increase the pleasure of eating; that which gives pleasure; the enjoyment given by anything; savor; zest; gusto; in *OE.*, delight given by anything. RELISHING, imp.: ADJ. palatable; savory. RELISHED, pp. *-isht*. RELISHABLE, a. *-ish-a-bl*, having an agreeable taste.—SYN. of 'relish, n.': taste; flavor; zest; gusto; appetite; liking; delight; savor.

RELIVE, v. *rē-liv'* [*re*, again, and *live*]: to live again; to revive; in *OE.*, to bring back to life.

RELOAD, v. *rē-lōd'* [*re*, again, and *load*]: to load anew, as a gun. RELOADING, imp. RELOADED, pp.

RELUCTANT, a. *rĕ-lŭk'tănt* [L. *reluc'tans* or *reluctan'tem*, opposing, resisting—from *re*, back or again; *luctor*, I wrestle; *luctu*, a wrestling]: much opposed in heart; unwilling; averse; in *OE.*, struggling against; resisting with violence. RELUC'TANTLY, ad. *-lĭ*. RELUC'TANCE, n. *-tăns*, or RELUC'TANCY, n. *-tăn-sĭ*, the state or quality of being reluctant; aversion of mind.—SYN. of 'reluctant': averse; unwilling; disinclined; loath; backward; coy; repugnant; indisposed; adverse.

RELUME, v. *rē-lūm'*, or RELU'MINE, v. *-lū'mĭn* [L. *re*, again; *lumen*, light: F. *rallumer*, to light again]: to light again; to rekindle. RELU'MING, imp. RELUMED', pp. *-lūmd'*, or RELU'MINING, imp. RELU'MINED, pp. *-mĭnd*.

RELY, v. *rē-lī'* [F. *relayer*, to ease another by undertaking his task—from L. *re*, back or again; OF. *layer*, to discontinue]: to rest or repose on; to have full confidence in; to depend on. RELY'ING, imp. RELIED', pp. *-līd'*. RELI'ER, n. *-ẽr*, one who relies. RELI'ABLE, a. *-ā-bl*, that may be depended on: see RELIABLE.—SYN. of 'rely': to depend; repose; trust; confide; lean upon; rest upon.

REMAIN, v. *rē-mān'* [Norm. F. *remainer*, to remain—from L. *remanēre*, to stay or remain behind—from *re*, back or again; *manĕo*, I stay: It. *rimanere*]: to continue; to be left as not comprised; to be left after; to be left out of a greater number or quantity; to stay; to last or endure; in *OE.*, not to be lost: N. in *OE.*, abode; habitation. REMAIN'ING, imp. REMAINED', pp. *-mānd'*. REMAIN'DER, n. *-dẽr*, that which is left or remains. in *arith.*, the difference; remnant; residue: in *OE.*, remaining survivors; in *law*, an estate limited to lands and tenements after deduction of another estate in the same which shall have determined; distinguished from a reversion in this, that in reversion, the remainder returns to the owner of the estate himself. CONTINGENT REMAINDER, an estate which may or may not ever become vested or enjoyable. REMAINS', n. plu. *-mānz'*, that which is left; a dead body; relics; remnants.—SYN. of 'remain': to rest; tarry; wait; await; abide; last; endure; continue; stay; sojourn; dwell;—of 'remainder': rest; balance; residue; remains; leavings; relics; remnant; refuse.

REMAKE, v. *rē-māk'* [*re*, and *make*]: to make anew.

REMAND, v. *rē-mănd'* [OF. *remander*, to send word again· It. *rimandare*, to send back again—from L. *re*, back or again; *mando*, I commit to one's charge]: to send back to custody or to jail an accused person for further examination on a future day: N. the being sent back to prison for further examination; the state or period of being remanded. REMAND'ING, imp. REMAND'ED, pp.

REMANENT, n. *rĕm'ă-nĕnt* [L. *rem'ănens* or *remănen'tem*, remaining (see REMNANT)]: OE. for REMNANT, which see: ADJ. in *OE.*, that remains; remaining. REM'ANENT MAG'NETISM, n. in *magnetism*, a quantity of magnetism retained by a bar of iron after a magnetic current has passed through it. A massive bar of iron retains its magnetism much longer than one formed of soft iron wires.

REMANET, n. *r-man'-et* [L. *remanet*, he or it remains]: that which remains over from some past time or arrangement; in *law*, a case for trial which has been postponed to another term: a thing allowed to lie over, to be taken up at some future time.

REMARK, n. *r-mârk'* [F. *remarque*, remark, observation—from *re*, again; *marquer*, to mark: It. *rimarco*, remark, consequence—see MARK 1]: notice or observation expressed in words or writing, a comment; silent notice: V. to notice; to observe; to regard, to express in words or writing thoughts about what is seen or heard; to express, as observations; to note in the mind: in *Ob.*, to distinguish; point out. REMARK'ING, imp. REMARKED', pp. *-mârkt'*. REMARK'ER, n. *-ér*, one who remarks. REMARK'ABLE, a. *-a-bl*, worthy of particular notice; that may excite wonder; notable; extraordinary; distinguished; famous. REMARK'ABLY, ad. *-a-bli*, in a manner worthy of observation; surprisingly; singularly. REMARK'ABLENESS, n. *-bl-nes*, the state of being remarkable.—SYN. of 'remark, n.': observation; note; annotation; comment; notice; of 'remark, v.': to notice; regard, note; heed; say, observe; point out;—of 'remarkable': noticeable; unusual; rare; famous; renowned; observable; extraordinary; strange; wonderful; notable; distinguished; eminent.

REMARRY, v. *r-mar'ri* [*re*, again, and *marry*]: to marry a second time. REMAR'RIAGE, n. *-rij*, a second marriage.

REMAST, v. *r-mâst'* [*re*, again, and *mast*]: to furnish with masts a second time.

REMASTICATE, v. *r-mas'ti-kat* [*re*, again, and *masticate*]: to chew over and over.

REMBANG, *rem-bang'*: a residency in Java, having nearly 3,000 sq. m., with extensive forests, containing fine timber, the haunts of wild cattle, swine, and three species of tiger. The products of R. are chiefly cocoa-nuts, coffee, sugar, tobacco, and cotton. Boat-building, fishing, weaving, making earthenware and paper, gold and silver work, are occupations.—R., the cap. (pop. 12,000), is a seaport; it has a govt. school, an institute for girls, and a Prot. church. Pop. of residency 1,120,000, including 16,000 Chinese and 600 Europeans.

REMBLAI, n. *rám-blá'* [F. *remblai*, the working for a bank or causeway; *remblayer*, to embank]: in *fort.*, the mass of earth or rubbish brought to fill up a hollow or to raise a bank—*deblai*, its opposite, denotes the materials excavated; the total height of the top of a parapet above the bottom of the ditch.

REMBRANDT HERMANSZOON, *rém'bránt hér'mân-zún* (REMBRANDT HARMENS VAN RIJN): chief painter of the Dutch school, and one of the world's great painters: 1607 (some say 1606, or 8), July 15—1669, Oct.; b. Leyden; son of a miller, Herman Gerritsz van Rhyn, whose house and mill were on an arm of the Rhine at Leyden. Rembrandt (by which name he is usually known) attended for a short time the Latin School at Leyden; and after study-

ing art three years under Jacob van Swanenburg, and for a brief period under Pieter Lastman at Amsterdam, and Jacob Pinas at Haarlem, he returned home, and gave himself to the study of nature. His works now attracted some attention; and about 1630 he was encouraged to establish himself at Amsterdam, where he soon entered on a most successful career, and executed numerous works—portraits, landscapes, historical and *genre* subjects, and those wondrous etchings, numbering more than 360, which almost as much as his paintings have given him fame. R. holds the chief place in the Dutch school; his power and originality are exemplified in almost every branch of his art; and as examples of composition, expression, color, and light and shade, his works rank with those of the greatest artists. He had numerous pupils, many of whom, e.g., Gerard Dow, G. Flinck, F. Bol, N. Maas, P. de Koning, and Vanden Eeckhout, were distinguished artists. R. spent his large gains in indulgence of his taste for works of art, arms, and objects of *virtù*, as is proved by an inventory of his effects, extracted from the registers of the insolvents' court at Amsterdam, for he fell into pecuniary difficulties, partly from his expensive habits, and partly on account of claims by the tutors of his son, after the death of his first wife. He married a second time, and left two children; his son Titus, by his first wife, died before him. The date of his death was long in doubt; but Dr. P. Scheltema, keeper of records at Amsterdam, published 1853 an extract from the register of burials in that city, proving that his interment was in the Westerkerk (West Church) 1669, Oct. 8. Many interesting facts concerning R. were brought to light from old documents, and published, by the same explorer.

The work of R. was one of development through several stages, as in the case of other great painters. From his 16th to his 25th year he was busy in making many studies in color or etching from the most characteristic persons observed in actual life around him; also in experiments on his own features in every variety of expression. His first portraits were hard, elaborate, cold, and well studied in effects of light and shade. After he went to Amsterdam, where his superiority was immediately recognized, his first great picture was his *Lesson in Anatomy* (1632, not the one of the same theme 1656), containing a number of portraits; the color is quiet, the execution painstaking, but the light and shade are bold. In some single portraits, also, of this period, he lifted this special art above its ordinary plane; e.g., his picture of his friend Coppenol (afterward the subject of two of his famous etchings), and the *Shipbuilder*, 1633. After his marriage, 1634, to the sumptuously beautiful Saskia van Ulenburgh, she was his favorite sitter not only in portraiture but in such character pieces as *Queen Artemisia*, *Bathsheba*, etc. At this time appeared some of his first examples of broad free 'handling,' and of warm, glowing color. His women, as in his noted compositions representing scenes in the life of Samson, and of Susannah, are more of the Netherland than of the spiritual type,

but the well developed animal phase of beauty seemed to have been the female ideal of many of the old masters. One of his most famous nude subjects is *Danaë* (1636), now at St. Petersburg. But, in the *Tobit* (now in Brussels), restored to sight while in the arms of his wife, there is pathetic sentiment; in the *Flight of the Angel* (1637) to be seen in the Louvre, the family of Tobit express profound awe; and in the *Christ as the Gardener* (1638, belonging to Buckingham Palace, there is no lack of high conception. From 1640 to 54 he was in the zenith of his power as a harmonious and rich colorist, while attaining to great sobriety and truth of expression and action, as in his *Manoah* (1641). At this time he painted the superior portrait, the *Cuyder*, now owned in the United States, and one of his own most magnificent portraits, owned by the Brit. National Gallery. In 1642 he produced a picture notable for the number of its life-size figures full of impetuous action, the *Night Watch*, representing guardsmen. After he lost his wife, the same year, it is thought that his grief found expression in a number of pathetic scenes from the life of the Holy Family and of Christ, such as the carpenter's shop at Nazareth, the *Woman Taken in Adultery*, the *Good Samaritan*, the *Pilgrims at Emmaus*, in all which there is a befitting lofty sentiment: the personality of Christ is majestic and divine. In 1656, after his bankruptcy, he achieved some of his finest works, e.g., as *John the Baptist Preaching* and *Jacob Blessing the Sons of Joseph*, less brilliant in color but masterly in *technique*. Among his last and best pictures were the *Jewish Bride*, and the *Family Group of Brunswick*. His famous etchings include *Christ Healing the Sick*, the *Death of the Virgin*, *Christ Preaching*, etc. He painted also animals and landscapes to some extent and with skill. In a loan collection in the Metropolitan Museum of Art (New York) were exhibited recently three fine portraits by R., and the *Adoration of the Shepherds*, similar to one in the Brit. National Gallery.

REMEASURE, v. *rē-mĕzh'ŭr:* to measure again.

REMEDIAL, REMEDILESS, etc., *see* under REMEDY.

REMEDY, n. *rem'ĕ-dĭ* [L. *remedium*, a cure or remedy —from *re*, again; *medeor* I heal: It. *rimedio;* F. *remède*, a remedy]: that which cures a disease or restores health; a cure; a reparation; that which counteracts or repairs an evil of any kind; relief; redress: V. to cure; to heal; to remove or repair an evil of any kind. REM'EDYING, imp. REM'EDIED, pp. *-dĭd.* REMEDIABLE, a. *rē-mē'dĭ-ă-bl,* that may be removed or cured. REME'DIABLY, ad. *-blĭ.* REME'DIABLENESS, n. *-bl-nĕs.* REME'DIAL, a. *-ăl,* tending to remedy or remove. REME'DIALLY, ad. *-lĭ.* REMEDIATE, a. *rē-mē'dĭ-āt,* in *OE.*, medicinal; affording a remedy. REMEDILESS, a. *rĕm'ĕ-dĭ lĕs,* not admitting a cure; incurable. REM'EDILESSLY, ad. *-lĭ.* REM'EDILESSNESS, n. *-nĕs,* the state of being without remedy. —SYN. of 'remedy, n.': cure; help; assistance; restorative; counteraction; relief; reparation; redress; aid; medicine;—of 'remediless': incurable; irretrievable; irreparable; cureless; irremediable; irrecoverable; desperate.

REMELT, v. *rē-mĕlt'*: to melt a second time.

REMEMBER, v. *rē-mĕm'bĕr* [OF. *remembrer*, to remember—from L. *re*, back; *memŏrārĕ*, to make mindful of; *memor*, mindful: It., *rimembrare*, to remember]: to bring back to the memory; to recollect, to retain in the mind or memory; to bear in mind; not to forget; in *OE.*, to put in mind. REMEM'BERING, imp. REMEM'BERED, pp. *-bĕrd*. REMEM'BERER, n. *-bĕr-ĕr*, one who remembers. REMEM'BRANCE, n. *-brăns*, the act or power of remembering; retention or revival in the mind or memory (see MEMORY); a token by which to keep in memory; memorial; in *OE.*, honorable memory; notice of something absent; admonition; memorandum; note to help memory. REMEM'BRANCER, n. *-brăn-sĕr*, one who or that which reminds or recalls to memory; a recorder; one of certain officers of the court of exchequer, and of some corporations, as of the city of London.—SYN. of 'remembrance': memory; recollection; reminiscence; memorial; token.

REMENYI, *rĕm'ĕn-yē*, EDUARD: violinist; b. Moskolc, Hungary, 1825. He studied music under Joseph Böhm at the Vienna Conservatoire, participated in the Hungarian revolution 1848; became acquainted with Franz Liszt, who gave him valuable assistance, went to London 1854, and became solo violinist to the queen; was pardoned and returned to Hungary 1860, and became violinist to the emperor of Austria. He first visited the United States 1877, and was favorably received in New York and elsewhere. In the following season he made a tour of the west, and 1891–2 played in Canada.

REMERCIE, or REMERCY, v. *rē-mĕr'sĭ* [F. *remercier*, to thank]: in *OE.*, to thank. REMER'CYING, imp. REMER'CIED, pp. *-sĭd*.

REMIGES, n. plu. *rĕm'ĭ-jēz* [L. *remĭgēs*, rowers; *remĭgo*, I row, I glide through the air—from *rēmus*, an oar]: the large quills of the wings of birds.

REMIGIUS, *rĕ-mĭj'ĭ-ŭs* (or REMEDIUS, or REMI, or REMY), SAINT: about 438—prob. 533, Jan. 13; b. Laon, Picardy; of noble family. for 53 years Bp. of Rheims. He was appointed to the bishopric against his will, at the early age of 22; and his episcopate is memorable for the conversion of King Clovis, who was baptized by R. 496. It was on occasion of this ceremony that, contrasting our Lord and His cross with the idols whom Clovis had hitherto adored, R. used the words which afterward became almost epigrammatic: 'Adore henceforward what thou hast hitherto burned, and burn that which thou hast adored.' R. lived to see Gaul almost entirely Christianized. Some of his letters are preserved in the *Bibliotheca Patrum*, as also two documents under the title of *Testamenta*, the genuineness of which has been the subject of a curious controversy.

REMIND, v. *rē-mīnd'* [*re*, again, and *mind*]: to cause to remember; to bring to notice. REMIND'ING, imp. REMIND'ED, pp. REMIND'ER, n. *-ĕr*, one who or that which reminds.

REMINGTONITE, n. *rem'ing-ton-īt* [after Edward *Remington* of Maryland] a mineral occurring as a rose-colored incrustation on serpentine at Finksburg, Md.: supposed to be a hydrated carbonate of cobalt.

REMINISCENCE, n. *re-ni-nis'ens* [F. *réminiscence* reminiscence—from L. *reminiscentia*—from *reminiscor*, 'I recall to mind'], the recalling to the mind, or the revival in the memory of ideas or impressions formerly received but forgotten, a statement of what one recollects or remembers.

REMIPED, n *rem'i-ped* [L. *remus*, an oar, *pes* or *pedem*, a foot]: an aquatic animal whose feet serve as oars.

REMIREMONT, *rā-mēr-mong'*: small town of France, dept. of Vosges, on the left bank of the Moselle, 17 m. s.e. of Epinal. Here, two abbeys, founded 620, were destroyed in the 16th c., but afterward rebuilt. Of these the more important was for lady canonesses. Its abbess was a princess of the empire, and those over whom she presided all were descended from families which had been noble for at least four generations. The remains of the abbey are the finest buildings in the town. In the Mairie is a public library of 8,000 vols. Cotton goods, leather, and ironware are manufactured. R. is the great mart for the neighboring mountain districts. Pop. 1891: 8,447.

REMISE, v. *re-mīz'* [F. *remise*, delivery, remittance: L. *remissus*, sent back—from *re*, back or again; *missus*, sent; *mitto*, I send] in *law*, to give or grant back; to resign a claim by deed. N. in *law*, a surrender; a release, as of a claim. REMIS'ING, imp. REMISED', pp. *-mīzd'*.

REMISS, a. *re-mis'* [L. *remissus*, slack, negligent—from *re*, back or again, *missus*, sent; *mitto*, I send: Sp. *remiso*, careless: It. *rimesso*, flagging]: careless; negligent; not attending to duty or engagements; slow; dilatory. REMISS'LY, ad. *-li*, carelessly; negligently; not vigorously; not with ardor or eagerness. REMISS'NESS, n. *-nes*, the state of being remiss; want of attention to business or duty; negligence. REMIS'SIBLE, a. *-si-bl* [F. L.]: that may be remitted or forgiven. REMISSION, n. *re-mish'un* [F. -L.]: abatement; release; cessation of intenseness; pardon; forgiveness; the sending of money to a distant place. REMIS'SIVE, a. *-siv*, remitting; forgiving. REMISSIO INJURIÆ [L. forgiveness of an injury]: in *Scotch law*, plea in answer in an action of divorce for adultery (see CONDONATION). —SYN. of 'remiss': slack; dilatory; careless; inattentive; heedless; slothful; negligent; neglectful; thoughtless; of 'remissness': carelessness; negligence; coldness; inattention; —of 'remission': abatement; relaxation; moderation release; pardon; forgiveness.

REMIT, v. *rē-mit'* [L. *remitto*, I loosen, I resign—from *re*, back; *mitto*, I send: It. *rimettere*: F. *remettre*]: to relax; to slacken; to surrender the right of punishment in whole or in part; to pardon; to absolve; to grow less violent; to transmit to another at a distance, as money, bills, etc. REMIT TING, imp. REMIT TED, pp. REMIT TER, n. *-ėr*, one who remits. REMIT MENT, n. *-mėnt*, forgiveness. REMIT TAL, n. *-ăl*, a giving up; surrender. REMIT TANCE, n. *-ăns*, the sending of moneys, bills, etc., to a person at a distant place; the sum, bill, etc., remitted. REMIT TENT, a. *-ĕnt*, ceasing, applied to diseases whose symptoms alternately diminish and return.—SYN. of 'remit': to relax; release; forgive; pardon; give up; resign; defer; refer; abate; relinquish; absolve.

REMITTENT FEVER: a variety of periodical malarial fever closely related to intermittent, as it was formerly supposed to be to yellow fever. Its cause, together with that of intermittent fever, or fever and ague, is conceded to be marsh miasm. In regard to its relation to yellow fever there has been much discussion, but as there is no intermission or remission after the first attack of yellow fever; as it is undoubtedly infectious, while R. F. and intermittent are not; as yellow fever is a town disease, while R. F. is peculiarly rural; as yellow fever prevails where neither R. F. nor intermittent are known; as it chiefly attacks unacclimated persons, while acclimatization affords no protection against R. F.; as an attack of yellow fever generally exempts from subsequent attacks, which is not the case with R. F., and as the remedies, chiefly antiperiodic, which control R. F. and intermittent have no special power in yellow fever, it is now held that the latter is a distinct disease. Moreover, in answer to those who holds that yellow fever is a malignant form of R. F., it may be stated that there are many cases of yellow fever which are milder than mild cases of R. F.

The characteristic lesions of remittent fever are the presence of dark pigment granules in the blood and several organs of the body, as the spleen, liver, brain, spinal cord, and the marrow of the bones. This constitutes the *bronzed condition*, and is sometimes called *melanosis* of an organ, and *melanæmia* when relating to the blood. The liver is in most cases enlarged, but when the disease is of long duration it may become atrophied. The pigment granules are found both in the interlobular tissue and in the lobules. In two cases in which more than a year before death R. F. had existed, the liver was found by Prof Alonzo Clark to retain a bronzed character, showing that this condition is slowly removed. The mucous membrane of the stomach is often subacutely inflamed, and there is frequent enlargement of the mucous follicles of the duodenum. Softening of the muscular walls of the heart also has been observed.

The attack begins usually with a chill, like that in intermittent fever, both of short duration, followed by a hot stage, of greater intensity than in that complaint. Giddiness followed by delirium is not infrequent. There is

pain, often severe, in the epigastric region, caused principally by subacute inflammation of the mucous membrane of the stomach, and perhaps by congorgement of the liver. There is almost always violent vomiting, the ejected matter often being streaked with blood, and containing more or less bile, a circumstance which caused the disease formerly to be called bilious R. F., a name appropriate at the present time. In mild cases a remission will take place in six or seven hours; but in severe cases the paroxysm of fever may last 30, or even 48 hours. During the remission the pulse falls in frequency, the skin usually becomes moist, the patient is comparatively comfortable and may have refreshing sleep. At the end of the remission another chill may occur, but it is often absent or very slight, and the febrile movement is renewed with as much or more intensity as at first. During the chill at the commencement the temperature of the body is actually raised, as shown by the thermometer in the axilla, but in the hot stage the temperature rises from 2° to 8°, and even more, above the range in health. A series of remissions may follow, corresponding more or less to the intermissions in intermittent fever. The disease is sometimes associated with typhoid fever, especially in camps, where typhoid germs are propagated in camp filth, and where it is known by the names of typho-malarial fever and camp fever. See Typhoid Fever and Typho-malarial Fever.

The treatment in simple R. F. consists to a great extent, in the administration of anti-periodic remedies, chiefly sulphate of quinia, the quantity being adapted to the character of the paroxysms and the remissions, and to the constitution and age of the patient. From 5 to 10 grains may be given at first, and repeated during 24 hours (some practitioners give twice this quantity, which is sometimes required). But quinia must not be employed to the neglect of other remedies. The alkaline carbonates may be depended on as great aids in restoring the functions of the numerous glands connected with the intestinal mucous membrane and the skin, and in keeping the serum and the blood globules in a more normal condition than would otherwise be the case. From a half dram to a dram of bicarbonate of soda may be given every four or six hours dissolved in water, to an adult, gradually diminishing the dose: it may be given with the quinia. Cathartics are not as much used as formerly, except when there is constipation, on account of the subacute inflammation of the stomach, but a saline aperient, such as Rochelle salts, sometimes, by osmose action (see Osmosis: Osmosis and Exosmosis), relieves the congested or inflamed condition of the organ. There has long been a discussion as to the propriety of giving calomel in this disease. Many years ago it was considered almost indispensable by many practitioners. Now it is discarded by many; while others insist that in minute doses it reduces the subacute inflammation of the stomach and promotes restoration of the hepatic functions. The hygienic treatment of R. F. must be conducted on rational principles now well known.

REMIX, v. *rē miks'* [*re*, again, and *mix*]: to mix again or repeatedly.

REMNANT, n. *rĕm'nănt* [a contr. of OE. *remanent;* OF. *remanent, remenant*, that which remains: L. *rem'ānens* or *remānen'tem*, remaining or staying behind—from *re*, back; *manēre*, [remain: It. *rimanente*, a remnant]: the part which is left; residue; that which is left of a piece of cloth, etc.—Syn.: remainder; remains; residue; rest; overplus.

REMODEL, v. *rē-mŏd'ĕl* [*re*, again, and *model*]: to model or fashion anew. Remod'elling, imp. Remod'elled, pp.

REMOLD, v. *rē-mōld':* to mold or shape anew.

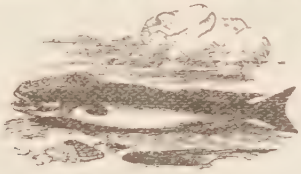
REMONETIZE, v. *rē-mŭn'ĕt-īz* [L. *re*, again; *monēta*, the mint, money (see Money)]: to restore payments in specie—that is, to make acceptance of payments in paper voluntary which was formerly obligatory; to restore bullion as alone the standard money of account. Remon'etizing, imp. Remon'etized, pp. *-ĕt-īzd.* Remon'etiza'tion, n. *-ĕt-iz-ā'shŭn*, the restoration of bullion as the standard money of account, instead of paper, its fictitious representative only.

REMONSTRATE, v. *rē-mŏn'strāt* [L. *re*, back or again; *monstrāre*, to show: F. *remontrer*, to remonstrate]: to urge or adduce strong reasons against any measure or proceeding; to expostulate. Remon'strating, imp. Remon'strated, pp. Remon'strant, a. *-strănt* [F.—L.]: urging strong reasons against an act; expostulatory: N. one who remonstrates: in *eccles. hist.*, term applied to the Arminians who presented 1610 to the assembled states of the province of Holland a '*Remonstrance*,' containing the chief articles of their belief (see Arminius, Jacobus). Remon'strator, n. *-strā-tĕr*, one who remonstrates. Remon'strance, n. *-strāns*, strong representation against a measure or proceeding; reasons urged in opposition; expostulation; in *OE.*, show; discovery.

REMORA, n. *rĕm'ō-rā* [L. *remŏra*, delay, hindrance; *remŏrārī*, to delay—from *re*, back; *mora*, delay]: in *med.*, a stagnation, as of the blood; in *OE.*, hindrance or obstacle.

REM'ORA, or Sucking-fish (*Echeneis*): genus of fishes which Cuvier placed among the *Discoboli* (q.v.), but which Müller assigns to the order *Anacanthi* and regards as constituting an entire family, *Echeneidæ*. Their chief relation to the *Discoboli*, indeed, is in the possession of a sucker, by which to affix themselves to objects of various kinds; but the sucker itself is very different. The remoras have an elongated body, covered with very small scales; one soft-rayed dorsal fin above the anal fin; head flattened, covered with an elongated disk extending back beyond it, which is the sucker; mouth large, with numerous small recurved teeth on both jaws, the vomer, and the tongue. The sucker-disk exhibits numerous transverse cartilaginous laminæ directed backward, and has a free flexible broad margin. These laminæ are formed by modification of the spinous processes of a first dorsal fin. They are moved simultaneously by sets of muscles raising or depressing them, and when they are raised after the margin of the

disk has been closely applied to a smooth surface, a vacuum is created; and so powerful is this appliance that great weights may be dragged by a R.; while it obstinately refuses to let go its hold, and will even submit to be torn in pieces before it does so. The White-tailed R. (*E. albicauda*), often called shark-sucker, is found around Long Island; it is 1–2 ft. in length, gray, with a dark lateral band. The Indian R. (*E. naucrates*) is larger, with 17–18 disk-plates, and occurs from the s. United States around the world to Japan. The Common R. (*E. remora*), of the Mediterranean,



Remora (*Echeneis remora*).

and of the ancients, is a small fish, seldom more than eight inches long, of dusky-brown color. It is found in the Atlantic, and occasionally as far n. as the British coast. It is frequently seen among fishes following ships, and often attaches itself by its sucker to some other fish, even of a kind that would make haste to devour it if it could be reached; often also to the rudder or bottom of a ship. The ancients imagined that it had power to impede or arrest the course of a ship, a fable credited till recent times. Thus, it was alleged, was Antony's ship detained from getting soon enough into action in the memorable and decisive battle of Actium. Of what use this power of adhesion is to the R. is not known. The R. is very palatable food. There are about ten known species, some of the tropical ones much larger than the Common Remora. One of them is said, on the authority of Commerson, to be used on the coasts of Mozambique for catching turtles: a ring is fixed round its tail, with a long cord, and the fish, placed in a vessel of sea-water, is carried out in a boat; the fishermen row gently toward a sleeping turtle, and throw toward it the R., which seldom fails immediately to affix itself, when the cord and turtle are drawn in.

REMORSE, n. *rē-mōrs'* [L. *remor'sus*, tormented, disturbed—from *re*, back or again; *mordĕō*, I bite: It. *rimorso:* F. *remords*]: the pain or anguish of conscience excited by the recollection of guilt; in *OE.*, pity; tenderness; sympathetic sorrow. REMORSE'FUL, a. *-fŭl*, full of remorse; in *OE.*, tender; compassionate. REMORSE'FULLY, ad. *-li.* REMORSE'LESS, a. *-lĕs*, unpitying; insensible to distress; cruel. REMORSE'LESSLY, ad. *-li.* REMORSE'LESSNESS, n. *-nĕs*, the state or quality of being remorseless; insensibility to distress. SYN. of 'remorse': regret; anguish; compassion; compunction; repentance; penitence; contrition;—of 'remorseless': unpitying; cruel; pitiless; relentless; savage; unmerciful; merciless; implacable; unrelenting.

REMOTE, a. *rē-mōt'* [L. *remōtus*, afar off, distant—from *re*, back; *mōtus*, moved; *movēre*, to move: It. *remoto:* OF. *remot*]: distant in any sense; not near; afar off; alien; foreign; not agreeing with; inconsiderable, as resemblance. REMOTE'LY, ad. *-li*, not nearly; at a distance. REMOTE'NESS, n. *-nĕs*, distance in any sense; not nearness; slightness: in *law*, undue prolongation of the period in which a provision in a will or deed in favor of some person, vests: the term denotes a violation of the 'rule against perpetuities,' which rule has for its object to prevent estates from being inalienable. This rule requires that an estate shall vest within a life or lives in being, with the addition of 21 years and the period of gestation afterward. REMOTION, n. *rē-mō'shŭn*, in *OE.*, state of being removed to a distance.

RÉMOULADE, n. *rā'mō-lăd'* [F. *rémoulade*, *rémolade*, a sharp sauce]: in cookery, a superior salad-dressing, consisting of the yolks of two eggs, boiled hard; flour of mustard about a teaspoonful, rubbed up with three or four tablespoonfuls of oil; to which when thoroughly incorporated, are added two tablespoonfuls of vinegar and a little pepper, and other flavoring materials according to taste. It is much used in making the salad Mayonnaise. The term is sometimes applied loosely to a pickle or sauce.

REMOUNT, v. *rē-mount'* [*re*, again, and *mount*]: to mount again; to reascend: N. a fresh horse with his equipments.

REMOVE, v. *rē-mōv'* [L. *removēre*, to remove—from *re*, back; *movĕō*, I move: It. *rimovere:* OF. *remouvoir*]: to take or put away; to put from its place; to change place in any manner; to change residence: N. act of moving; state of being removed; change of place; departure; a step in any scale of gradation; an indefinite distance; a dish to be changed while the rest of the course remains; in *OE.*, translation of one to the place of another. REMOV'ING, imp. REMOVED', pp. *-mōvd:* ADJ. remote; distinctly separate from others. REMOV'ABLE, a. *-ă-bl*, that may be removed from an office or station. REMOV'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, the capacity of being removed or displaced. REMOV'AL, n. *-ăl*, act of moving; state of being removed; dismission from a post; change of residence; act of putting an end to. REMOV'EDNESS, n. *-ĕd-nĕs*, the state of being removed; remoteness.

REMOVAL OF GOODS, by a tenant: act to prevent the landlord distraining or seizing the goods in payment of rent. If a tenant fraudulently and secretly removes goods from leased premises, and the rent is already due, the landlord might take and seize these within a certain time fixed by statute, wherever they might be found; but if the goods were removed before the rent became due, the landlord could not follow them. This is an incident of the procedure of distress of goods for the nonpayment of rent. The whole doctrine of distress for rent is unpopular in the United States, and it has been abolished with all its incidents in many states: in those where the remedy still exists, it is governed by statutory provisions.

REMSCHEID, a manufacturing town of Prussia, govt. of Düsseldorf, 2,150 ft. above sea-level, 18 miles e.s.e. of the city of Düsseldorf. Originally a villa, it was in possession of a church as early as 1189. It contained several iron foundries 1580, in which pig-iron was worked into bars by hand. Its iron trade and manufactures were advanced by immigration of members of artisan Refugees (q.v.). It has extensive manufactures of iron wares, cutlery, etc., which are exported to all parts of the world. Pop. (1872) 22,017; (1880) 30,029; (1890) 40,509.

REMUNERATE, v. *rē-mū'nĕr-āt* [L. *remūnĕrātus*, rewarded or recompensed—from L. *re*, back; *mūnus*, a gift; It. *remunerare;* F. *rémunérer*]: to reward or recompense for any service, loss, or expense; to repay or requite. REMU'NERATING, imp. REMU'NERATED, pp. REMU'NERABLE, a. *-ā-bl*, capable of being remunerated; fit or proper to be recompensed. REMU'NERABIL'ITY, n. *-bil'i-ti*, the capability of being rewarded. REMU'NERA'TION, n. *-ā'shŭn* [F.—L.]: a payment or equivalent for services, loss, or sacrifices; reward; recompense. REMU'NERATIVE, n. *-ā-tĭv*, yielding reward or recompense; profitable. REMU'NERATORY, n. *-ā-tŏr-i*, affording recompense; rewarding.—SYN. of 'remunerate': to compensate; reimburse; reward; requite; repay; recompense; satisfy; pay.

REMURMUR, v. *rē-mĕr'mĕr* [*re*, again, and *murmur*]: to return or echo in low hoarse sounds; to utter back in murmurs.

RÉMUSAT, *rā-mū-zâ'*, CHARLES, Comte DE: French philosopher and politician: 1797, Mar. 14—1875, June 6; b. Paris; son of Auguste Laurent, Comte de R., Provençal gentleman who held various public offices during the first Empire and after the Restoration. R. studied with brilliant success at the Lycée Napoléon, and made his political *début* 1818 as a Doctrinaire journalist, allying himself closely with Guizot, who, he confessed, had more than any other influenced his opinions, but he subsequently withdrew from this connection, and became more independently liberal, though always with temperate views. Some of his earlier political essays were important. On the establishment of the *Globe* 1824, R. became one of its most indefatigable contributors, and his name appears in the list of journalists who signed the protest against the fatal 'ordonnances' of the minister Polignac, which brought about the July revolution. After 1830 R. entered the French chambers as deputy, serving till 1848. He supported the ministry of Casimir Périer, was for a brief period under-sec. of state (1836) in that of Comte Molé; and 1840, under Thiers, he was made minister of the interior, but soon resigned. After the flight of Louis Philippe, he was a supporter of the party of order. He was exiled after the *coup d'état* of Louis Napoleon, but subsequently received permission to return. He engaged in literary and scientific studies, till Thiers called him, 1871, Aug., to the portfolio of foreign affairs, which he retained until 1873. He was long a well-known contributor to the *Revue des Deux Mondes*. R. had unusual intellectual powers; and was one of those men from whom great things were always expected, but who fall short of large achievement, perhaps by reason of an extremely critical bent of mind. Among his writings are *Essais de Philosophie* (Paris 2 vols. 1842); *Abélard* (2 vols. 1845); *Passé et Présent* (2 vols. 1847); *Angleterre au XVIII^e. Siècle* (1856); *Bacon* (1858); *Hartley* (1874); *Histoire de la Philosophie Anglaise de Bacon à Locke* (1875); and his philosophical drama, *Abélard* (1877).

RÉMUSAT', Claire Elisabeth Jeanne Gravier (de Vergennes), Comtesse de: 1780, Jan. — 1821; b. Paris; mother of Count Charles François Marie de R., and grand-niece of Vergennes, prime minister under Louis XVI. She married when very young, was a maid of honor and an intimate friend of Empress Josephine, and a noted beauty of Napoleon's court. Her endowments of mind and heart were rare; and she left very interesting and valuable *Mémoires* (not pub. till 1879, 8°, two vols.), exposing Napoleon's base character by an analytical narrative of his home life, which supplies evidence of its own truthfulness.

RÉMUSAT, Jean Pierre Abel, distinguished Chinese scholar, 1788, Sep. 5 — 1832, June 4, b. Paris. He studied medicine, and took his diploma 1813, but as early as 1811, had published *Essai sur la Langue et la Littérature Chinoises*, the fruit of five years' arduous work. In 1813, the conscription seized him, but, instead of being compelled to serve as a common soldier, he was appointed asst. surgeon in the Paris milit. hospitals, and was subsequently in charge of fever-patients at the hospital Montaigu. In the midst of arduous professional duties he found time to prepare for the press *Grammaire Mandchoue*, and *Dissertation sur la Nature Monosyllabique attribuée communément à la Langue Chinoise*. At last, a chair of Chinese was instituted at the Collége de France, and R. was named prof. 1814. Among his numerous subsequent works are—*Recherches sur les Langues Tartares* (1820), *Éléments de la Grammaire Chinoise* (1822), the greatest monument of his vast Sinological erudition, *Recherches sur l'Origine et la Formation de l'Écriture Chinoise* (1827). Walckenaer said of him: 'He has endeavored to embrace everything relating to the nations which he proposed to make known. Religious beliefs, philosophical systems, natural history, geography, political revolutions, the origins of races, biography, literature, manners, habits, and customs—he has treated all in an equally masterly style.' Others of his works illustrative of this eulogy, are *Étude Historique sur la Médecine des Chinois; Tableau Complet des Connaissances des Chinois en Histoire Naturelle* (unfinished); *Sur la Pierre Ju* (a curiously learned disquisition on a crowd of historical questions and religious rites); *Notice sur la Chine et ses Habitants* (in which the author treats of the extent, administration, manners, commerce, etc., of China); *Sur l'Extension de l'Empire Chinois en Occident depuis le Premier Siècle avant Jésus-Christ jusqu'à nos Jours*. R. was the first to make known in Europe the life and opinions of the philosopher Lao-tsze, head of the religious sect, *Tao-tsé;* and he wrote on the history of Buddhism. In 1818 R. became one of the editors of the *Journal des Savants;* 1822 he founded the *Société Asiatique* of Paris. He died of cholera at Paris, at the early age of 44.

RENAISSANCE, *rē-nā'sans*, F. *re-nā-sŏngs'*, in Architecture: style which succeeded the Gothic in Europe, and preceded the rigid copyism of the classic revival in the first half of the 19th c. See ITALIAN ARCHITECTURE for the rise and progress of the R. in the country of its birth. The spread of classical literature during the 15th and 16th c. (see RENAISSANCE, THE) created a taste for classic architecture in every country in Europe. France, from her proximity and constant intercourse with Italy, was the first to introduce the new style n. of the Alps. Francis I.

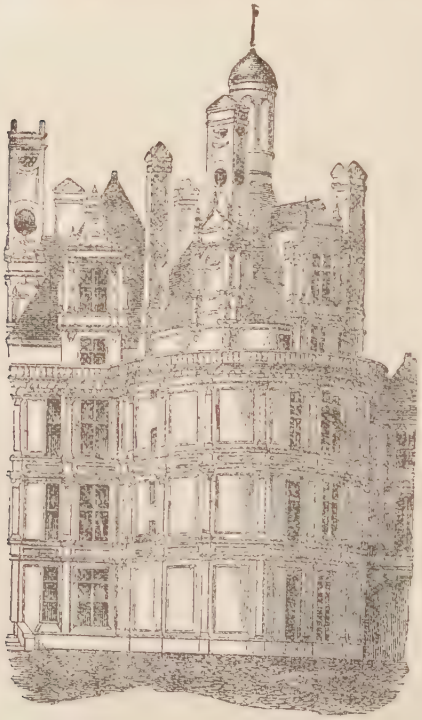


Fig. 1.—Chateau of Chambord.

invited Italian artists to his court in the the first half of the 16th c: the most distinguished were Leonardo da Vinci, Benvenuto Cellini, Primaticcio, and Serlio. These artists introduced Italian details, which native architects applied to the old forms to which they were accustomed and which suited the purposes of their buildings, thus originating a style similar to, though diverse from, that of Italy.

The Italian buildings were chiefly churches, St Peter's being the great model. In France (as in other countries n. of the Alps), the supply of churches was greater than was

Pavilion de l'Horloge, Louvre, Paris, 1621.

San Zaccaria, Venice, erected 1457–1515

required. The grand domestic buildings of Florence and Rome were actually needed for defense, and were founded in design on the old mediæval castles, which the nobles occupied within the cities. The domestic architecture of France is taken rather from the luxurious residences of the monks, and though very graceful in outline and in detail, its buildings lack the force and grandeur of the Italian palaces.

In the French R. so much are the old Gothic forms and outline preserved, that the buildings of Francis I. might, at a short distance, be mistaken for Gothic designs, though, on nearer approach, all the details are found to be imitated from the classic. Such are the palaces of Chambord and Chenonceaux on the Loire, Fontainebleau, and many others. The churches of this period are the same in their principles of design. Gothic forms and construction are everywhere preserved, while the detail is as near classic as the designers could make it. St. Eustache, in Paris, is one of the finest examples of this transitional style.

From the middle of the 16th to the middle of the 17th c., a style prevailed which may be said to have combined all the defects of the R. It was neither classic nor Gothic. It had no principles of construction or decoration except the individual caprice of the designer. This style, known usually as that of the time of Henry IV., is the basest which has been adopted in France, and has no redeeming qualities. It may be distinguished by the constant use of meaningless pilasters, broken entablatures, curved and contorted cornices, architraves etc., all applied so as to conceal rather than to mark and dignify the real uses of the features of the buildings. The Tuileries, wrecked by the Commune, showed all these defects. From this debased and meaningless style architecture gradually recovered, and during the 18th c., a style more becoming the dignity and importance of the *Grand Monarque* was introduced. The classic element began to prevail, to the entire exclusion of all trace of the old Gothic forms. Many very large palaces are in this style; but, though grand from their size, and striking from their richness and luxuriance, they are frequently tame and uninteresting as works of art. The palace of Versailles (q.v.) is the most prominent example. The two Mansards, one of whom designed Versailles, had great opportunities during this extravagant epoch. Their invention of giving a row of separate houses the appearance of one palace, which has ever since saved architects a world of trouble, was one of the worst blows which true street-architecture could have received. The e. front of the Louvre, designed by Perrault, is one of the best examples of the style of the age. Many elegant private hôtels and houses in Paris were erected at this period. The most striking peculiarity of the style of Louis XIV. is the ornament then used, called Rococo (q.v.).

The classic R. was completed in the beginning of the 19th c. by the literal copyism of ancient buildings. Hitherto, architects had attempted to apply classic architecture to the requirements of modern times; now they tried to make

modern wants conform to ancient architecture. In the Madeleine, for instance, a pure peripteral temple is taken as the object to be reproduced, and the architect has then to see how he can arrange a Christian church inside it. Many buildings erected during the time of the Empire are indeed very impressive, with noble porticoes and broad

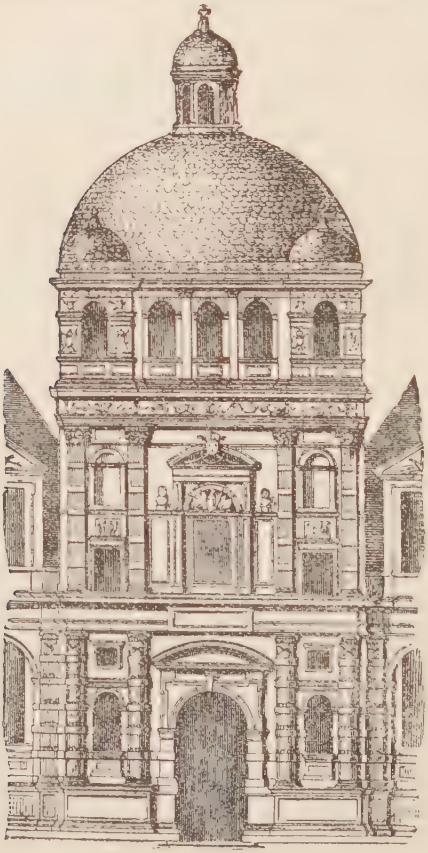


Fig. 2.—Central Pavilion of the Tuileries,
As designed by De Lorme (from Mariette).

blank walls; but they are in many respects mere shams; attempts to make the religious buildings of the Greeks and Romans serve for the conveniences and requirements of the 19th c. This has been found an impossibility—people have rebelled against houses where the window-light had to be sacrificed to the reproduction of an ancient portico,

and in which the height of the stories, the arrangement of the doors, windows, in fact all the features, were cramped, and many destroyed. The result has been that this cold and servile copyism is now entirely abandoned, and the French are working out a free kind of R. of their own, which promises well, and is at the present moment, as the streets of Paris testify, the liveliest and most appropriate style in use for modern street-architecture.

In Spain, the R. style took early root, and from the richness of that country at the time, many fine buildings were erected; but it soon yielded to the cold and heavy 'Greco-Romano' style: and that was followed by extravagances of style and ornament more absurd than any of the reign of Louis XIV. The later R. of Spain was much influenced by the remnants of Saracenic art which everywhere abound in that country.

In England, as in other countries of Europe, classic art accompanied the classic literature of the period; but, being at a distance from the fountainhead, it was long before the native Gothic style gave place to the classic R. It was more than a century after the foundation of St. Peter's that Henry VIII. brought over two foreign artists—John of Padua and Havenius of Cleves—to introduce the new style. Of their works, we have many early examples at Cambridge and Oxford, in the latter half of the 16th century. Longleat, Holmby, Wollaton, and many other county mansions, built toward the end of the 16th c., are fine examples of the gradual introduction of the new style. The course of the R. in England was similar to its progress in France, though slower. Little classical feeling prevailed till about 1620. The general expression of all the buildings before that date is almost entirely Gothic, though an attempt is made to introduce classical details. The pointed gables, mullioned windows, oriels and dormers, and the picturesque outlines of the old style, all are retained long after the introduction of quasi-classic profiles to the moldings. This style, which prevailed during the latter half of the 16th c., is called Elizabethan, and corresponds to the somewhat earlier style in France of the time of Francis I. This was followed in the reign of James I. by a similar but more extravagant style called Jacobean, of which Heriot's Hospital is an example; the fantastic, ornaments, broken entablatures, etc., over the windows being characteristic of this style, as of that of Henry IV. in France.

The first architect who introduced real Italian feeling into the R. of England was Inigo Jones. After studying abroad, he was appointed supt. of royal buildings under James I., for whom he designed a magnificent palace at Whitehall. Of this, only one small portion was executed (1619–21), and still exists under the name of the Banqueting House, and is a good example of the Italian style. Jones erected also several elegant mansions in this style, which then became more generally adopted. In the latter half of the 17th c., a splendid opportunity occurred for adoption of the R. style after the great fire of London,

Sir Christopher Wren rebuilt an immense number of churches in that style, of which St. Paul's (q.v.) was the most important. The spire of Bow Church and the interior of St. Stephen's, Wallbrook, are much admired.

During the 18th c., classic feeling predominated, and gradually extended to all classes of buildings. In the early part of the century, Vanbrugh built the grand but ponderous palaces of Blenheim and Castle Howard, which have

Fig. 3.—Park Front of Castle Howard.

a character and originality of their own. To these succeeded a vast number of noblemen's mansions, designed by Campbell, Kent, the Adamses, and others. Many of these, like the contemporaneous buildings of France, are of great size and magnificence; but they are usually tame and cold in design, and a sameness pervades them all. They generally consist of a rustic basement-story, with a portico over the centre, and an equal number of windows on either side. The portico is considered essential, and though perfectly useless, the light and convenience of the house are invariably sacrificed for it.

The further study of the buildings of Greece and Rome led, in the beginning of the 19th c., to the fashion of reproducing them more literally. All important public buildings were now required to be absolute copies of ancient buildings, or parts of them, or to look like such; and then the architect had to work out the accommodation as best he might. St. Pancras' Church in London is an example; it is made up of portions from nearly every temple in Greece. Many really successful buildings, such as St. George's Hall, Liverpool, the High School and Royal Institution in Edinburgh, have been erected in this style; but they owe their effect not to their being designs well adapted to their requirements, but to the fact, that they are copies from the finest buildings of antiquity. Sir Charles Barry was the first to break away from this thraldom, and to return to the true system of designing buildings—by arranging their general features so as not only to express the purposes that they are intended to serve, but in so doing to form the decorative as well as the useful fea-

tures of the buildings. The Travellers' Club house and Bridgewater House in London are admirable specimens of his design. There are no superfluous porticoes or obstructive pediments, but a pleasing and reasonable design is produced by simply grouping the windows, and crowning the building with an appropriate cornice.

Fig. 4.—Part of Park Front of Bridgewater House.

As above noticed, a similar style of domestic architecture is now being worked out in France; but both there and in Britain there has been a reaction against everything classic; and a revival of mediæval architecture has superseded that of classic, especially in ecclesiastical buildings. A very large number of churches have been erected within the last 20 years in the Gothic style, but it cannot be said that these are usually well adapted to the modern Prot. service. The most magnificent example of this style is the Palace or Houses of Parliament at Westminster.

In Germany, Russia, and every country of Europe, the R. prevailed in a manner similar to that above described. In Germany, there are few specimens of early R., the picturesque castle of Heidelberg being almost unique as an early example. The Zwinger and the Japanese palace at Dresden, which are nearly alone as edifices of the beginning of the 18th c., show how poor the architecture of Germany then was. In the domestic buildings of Nuremberg, Dresden, and other towns of n. Germany, there are many instances of the picturesque application of classic detail to the old Gothic outlines.

One of the most striking examples of the revival of classic art occurred in Bavaria during the first half of the 19th c., under the auspices of King Louis. He caused all the buildings that he had seen and admired in his travels to be reproduced in Bavaria. Thus, the royal palace is the

Pitti Palace of Florence on a small scale; St. Mark's at Venice is imitated in the Byzantine Chapel-royal; and the Walhalla, on the banks of the Danube, is an exact copy (externally) of the Parthenon. The finest buildings of Munich are the Picture-gallery and Sculpture-gallery by Klenze, both well adapted to their purpose, and good adaptations of Italian and Grecian architecture. In Vienna and Berlin, there are many examples of the revived Classic and Gothic styles, but the Germans have always understood the former better than the latter The museums at Berlin, and many of the theatres of Germany, are good examples of classic buildings.—The domestic architecture of Berlin is well worthy of notice, many of the dwelling-houses being quite equal in design to those of Paris.

Of the other countries of Europe, the only one which deserves remark for its R. buildings is Russia. St. Petersburg is, of all the cities of Europe, the one which best merits the title of a city of palaces. From the date at which the city was founded, these all are necessarily R. in character. Nearly all are the works of German or Italian architects, and unfortunately, for the most part in the coldest and worst style. The ornaments of the palaces are chiefly pilasters running through two stories, with broken entablatures, etc., and ornaments of flimsy rococo. The New Museum, by Klenze, is, however, a marked exception.

Together with architecture, during the period of the R., Painting (q.v.) and Sculpture (q.v.) and all the other arts took their models from the classic remains which were so carefully sought for and studied. All ornamental work, such as carving, jewellery, and metal-work of all kinds, followed in the same track. Mediæval niches and pinnacles gave place to the columns and entablatures of the classic styles, and the saints of the middle ages yielded to the gods and goddesses of ancient Rome.

RENAISSANCE, n. *rè-nā'sans*, F. *rèh-nā-sŏngs'*, THE (sometimes RENASCENCE, *rè-nās'sèns*) [F., new birth—from *re*, again; *naissance*, birth; *naître*, to be born—from L. *nasci*, to be born]: comprehensive name for the great intellectual movement in Europe in the early part of the 16th c., which marks the transition from the Middle Ages to the Modern World; a movement including a very marked change in attitude of mind and ideal of life, as well as in philosophy, art, literary criticism, political and religious thought. (For a phase aside from the scope of this article, see RENAISSANCE, in Architecture.) Substantially a revolt against the barrenness and dogmatism of Mediævalism, the new spirit claimed the entire liberation of reason; and passionately recognizing and studying the rich humanity which flourished in the classical times of Greece and Rome, aimed at a complete rehabilitation of the human spirit with all the free activities, and arts, and graces which invested that earlier age. It was an escape—at first hesitating, then triumphant—from a life regulated and confined on all sides by ecclesiastical tradition and intellectual

tyranny, into joyous freedom and unfettered spontaneity —the most pregnant revolution history has seen. Zeal for the *Litteræ Humaniores* brought forth a new ideal of culture, and the new view of life for which the term Humanism is used. R., re birth, was used originally as synonymous with the Revival of Letters, the resurrection of an accurate knowledge of the classical languages and classical literatures of Greece and Rome in all their depth and breadth, interpreted in their own spirit, and divested of the narrow traditional limitations. Greek in especial was practically a new discovery, and a vastly important one, but the knowledge of the classics was only one side of the movement which permeated and transformed philosophy, science, art, and religion. The new spirit powerfully aided in the revolt from the papacy, in the establishment of Protestantism and the right of free inquiry. Under its impulse astronomy was reformed by Copernicus and Galileo, and science started on its modern unfettered career; by it, too, feudalism was abolished, and the demand for political liberty began to be raised. Reverence for the Holy Roman Empire and for its ancient rival the Papacy were alike decaying; a new sense of nationality was springing up, and national languages began to flourish. To the same general impulse, as causes or effects, belonged also the invention of printing and multiplication of books, new methods of paper making, the invention of gunpowder, the use of the mariner's compass, the discovery of America, and the exploration of the Indian Sea. The fall of the Eastern Empire, 1453, sent swarms of Greek scholars to promote the revival of scholarship, already in progress in w. Europe. From the nature of the case it is impossible to fix a definite date for the beginning of the R.; long before the close of the Dark Ages there were isolated scholars and thinkers who anticipated the new light. But the main stream of the movement originated in Italy toward the end of the 14th c., and, attaining its full culmination there in the earlier half of the 16th, the R. extended throughout all the rest of Europe; France, Germany, England, and other countries, participating later in the movement, which in each of them took a somewhat different shape. But Italy specially was the nursing-mother of the Renaissance. (For the main development of the R. in religion, see REFORMATION, THE: for its influence in art, see SCHOLASTICS: HUMANISTS. See also ITALIAN ARCHITECTURE: PAINTING: and the numerous articles on the great authors and thinkers of the period—Boccaccio, Bruno, Campanella, Cimabue, Erasmus, Gemistus, Giotto, Petrarch, Raphael, etc.)

For the first herald of the R. we may go as far back as Dante (1265–1321), who, with all his mediævalism of conception, yet by the pristine energy and fulness of his poetry, was a worthy follower of his chosen master, Virgil. The first positive impulse, however, in that direction was imparted by Petrarch (1304–74). Besides suggesting in his Italian *Rime* the old Roman grace, he awoke enthusiasm for the classics by his Latin epic and numerous

epistles and dissertations. In his old age he tried to imbibe a little Greek at the extremely sorry sources within his reach, and on receiving Homer from Constantinople, urged Boccaccio to translate the supreme poet into Latin. Boccaccio did not rest till he had piously, though very imperfectly, rendered into Latin both the *Iliad* and *Odyssey*. A secretary of Petrarch, Giovanni Malpaghino, commonly called da Ravenna, was the most accomplished Latinist of his day, and wandering, as he did, all over Italy, communicated the new fermentation to distinguished pupils, Barbaro, Strozzi, Poggio, Bruni, who, in their turn, propagated it anew from Venice, Rome, Mantua, and elsewhere. Luigi Marsigli's house became a private academy of the new doctrine, a resort of all the promising neophytes of Florence. Caluccio de Salutato, who translated Dante into Latin, having been made chancellor of Florence 1375, introduced into public documents the stately sonorous periods of the classic style, and so rendered it imperative on all princes and popes of the next age to have trained stylists as their secretaries. A like classic transformation was effected in epistolary correspondence by Gasparino da Barzizza, who made a special study of Cicero's letters. The glory of having been the first Florentine to visit Byzantium for the sake of learning the sacred Greek belongs to Giacomo da Scaparia. To Salutato and Palla degli Strozzi is due the foundation of a Greek chair at Florence; and 1396, Manuel Chrysoloras, a genuine Greek in the flesh, began his instructions from the Greek chair. Chrysoloras planted schools also at Rome, Padua, Milan, and Venice. In the earlier period of the R., Florence leads the van. The president of the republic, Cosmo de' Medici, himself a scholar, theologian, philosopher, musician, financier, a connoisseur in painting, sculpture, and architecture, figures as the magnificent Mæcenas of the new learning, founding the Platonic academy, and opening his hospitable house to all the wits at home, and all the distinguished visitors attracted thither. The son of his physician, Marsilio Ficino (q.v.), Cosmo educated for the express purpose of interpreting Plato. Strozzi, perhaps the richest after Cosmo of the merchant princes of Florence, sent to Greece for countless volumes of MSS., and constantly kept copyists employed. Niccolo de' Niccoli spent his whole fortune in buying MSS., or procuring copies. Poggio Bracciolini, one of the most eminent of the scholars of his time, rescued Quintilian from a 'foul prison' and transcribed him, and copied with his own hand MSS. of Lucretius and Columella, while he also unearthed Italicus, Manilius, and Vitruvius. Though for 50 years chancellor in the Roman Curia, he directed the most poignant satires against the church. Vespasino da Bisticci (1421–98) was perhaps the last of the mediæval scribes, and the first of modern booksellers; he was agent of Cosmo, Nicholas V., and Frederick of Urbino, supplier of MSS. to Hungary, Portugal, Germany, and England, and the largest employer of copyists in Europe, whom, too, he personally superintended. The second period in the history of the R. is distinguished by indis-

criminate avidity for everything classic. As its most characteristic scholar may be cited Francesco Filelpho (1398–1481). Having studied rhetoric and Latin at Padua, he learned Greek at Constantinople, and became prof. at Venice, Bologna, and Florence, and the admiration of all Italy for erudition. In the third period of the R., the leading figures are Lorenzo de' Medici and Poliziano at Florence; Boiardo at Ferrara; and Sannazaro at Naples. President of Florence from 1469, and a universally versatile man, Lorenzo de' Medici was, like his grandfather Cosmo, his son Giovanni (Leo X.), and his nephew Giulio (Clement VII.), a munificent patron of learning. By the consent of all, the consummate writer among the humanists is Poliziano, whose *Manto*, *Ambra*, and *Nutricia* display almost as spontaneous a command of the classic languages as do his *Orfeo*, *Stanze*, and *Rime* of his native Italian. Toward the end of the 15th c. mere erudition began to sink in credit, and the accomplished personages who adorn the fourth period are of somewhat more independent type—the historians, Guicciardini and Machiavelli; the handsome Bembo, the splendid Alberti, Castiglione, author of *Cortegiano*, and Ariosto, author of *Orlando Furioso*, the *Cinque Canti*, and the polished cynical *Satires*. Some of the faults of the R. clung to it in all its periods. At one time pedantry threatened to check originality and spontaneity; the worst ancient works were prized more than the best written in the new European tongue. Petrarch valued himself mainly for his Latin works, and thought lightly of his Italian poems. The tendency was established to regard the classics as the one standard of learning and the one instrument of education. A worse fault was it that the revolt against mediæval religious tradition was accompanied to a very large extent by absolute and anti-Christian immorality and license. Literary and artistic refinement placed no check on brutal lusts and savage passions; though in a few men of high character, Michael Angelo, Raphael, Pico della Mirandola, Ficino, and others, in whom Humanism did not extinguish the principles of Christianity and morals, a singularly noble and complete humanity was displayed. The culmination of the R. in Italy may be dated within the half-century, 1456–1500; and its close for the land of its birth may be fixed at the sack of Rome 1527 by the Constable de Bourbon (q. v.), followed by the transference of Humanism in its later developments to France, England, and the rest of Europe.

In Germany, the change was as marked as in Italy, but the Humanism of Germany and the Low Countries was very different in spirit from that of Italy. Not less tinged by a revived love for ancient learning, it was never divorced from morality nor hostile to Christianity; and its most important direct development was the Reformation. Biblical and Oriental studies were strenuously cultivated. Among noted leaders were Erasmus, Melanchthon, Reuchlin, and Von Hutten. In the Netherlands and Flanders, the new school of painting was a notable development. In

France, the movement had rich results in art and letters. De Comines, Villon, Marot, Ronsard, but above all Rabelais, are types of the French R. in literature; while within the sphere of scholarship and religious reform, are the Scaligers, Dolet, Muretus, Cujacius, Salmasius, Casaubon, Beza, Calvin.

In England, Wycliffe and Chaucer may be regarded as the forerunners of the Reformation and the R.; but the main stream of both these movements reached England contemporaneously. In scholarship the great names were Grocyn, Linacre, Colet, Ascham, and More; but the fullest English result of the R. was the glorious Elizabethan literature, with Spenser and Shakespeare, and in philosophy, Bacon, as its most noted representatives.

See Burckhardt's *Die Cultur der Renaissance;* Pater's *Studies of the Renaissance;* Michelet's *Renaissance;* Geiger's *Humanismus;* Pasquale Villari's *Il Rinascimento;* Symonds's *Renaissance in Italy.*

RENAIX, *reh-nā':* town of Belgium, province of E. Flanders, picturesquely situated, 24 m. by railway s. of Ghent. Brewing, tanning, distilling, and salt-refining are carried on; and fine linen and damasks, woolen fabrics, hats, and tobacco, are extensively manufactured. Pop. (1880) 15,000; (1885) 16,003; (1890) 16,912.

RENAL, a. *rē'năl* [F. *rénal,* renal—from L. *rēnālis*—from *renes,* the kidneys, the reins: It. *renale* (see REINS)]: pertaining to the reins or kidneys. RE'NIFORM, a. *-nĭ-fawrm* [L. *forma,* form]: of the form of kidneys.

RENAN, *reh-nong',* JOSEPH ERNEST: philosopher and orientalist: 1823–1892, Oct. 2; b. Trégnier (Côtes-du Nord). His first education he received at the hands of the priests who directed the school of his native place. At 16 years of age he was sent to Paris, where he entered the seminary of Abbé Dupanloup, to prepare himself for the priesthood. Three years later, he went to Issy, and having completed his philosophical studies there, to St. Sulpice. On leaving this, however, he declared himself unable to follow the path traced for him. The theological and linguistical studies, to which he had devoted himself with rare industry, had led him to results which did not seem to allow him the exercise of priestly functions in his church. He took the place of *répétiteur* in a school, and here prepared himself for an academical career. In 1847 his Memoir, *Sur les Langues Sémitiques* ('On the Semitic Languages') obtained the Volney prize; and 1848 another Memoir *Sur l'Étude du Grec dans l'Occident au Moyen Age* ('On the Study of Greek in the West during the Middle Ages'), was crowned. In 1848 he began to publish a periodical, *La Liberté de Penser* ('Liberty of Thought'), in which he embodied some of his most brilliant essays on theology, philosophy, philology, history, and the many variegated branches of his studies—all merely preparatory to the great work for which he concentrated all his energies—the investigation of the origin of Christianity, which, according to him, is as human and natural, and has grown out of the history and

circumstances of the times in precisely the same manner, as any other event in the records of humanity. His Memoir, *Sur les Langues Sémitiques*, he expanded 1855 into *Histoire Générale des Langues Sémitiques* ("General History of the Semitic Languages"), which, with all its defects, is the most methodical and brilliant compilation on the subject. Of the variety of subjects to which he applied himself, his numerous contributions to the *Revue des Deux Mondes* and the *Journal des Débats*, bear witness. In 1850 he published a historical essay, *Sur Averroès et l'Averroïsme*, for which he had collected materials on a scientific journey to Italy. In consequence of this he was appointed *Employé* at the Imperial Library in Paris. He further produced translations of Canticles and the Book of Job, with introductions and commentaries (*Le Cantique des Cantiques*, etc., 1860, *et Le Livre de Job*, etc., 1859). In 1860 he was sent by the emperor on a tour of exploration to Syria and Phœnicia, whose results were given to the world in *Mission de Phénice* (1864) and other works. On his return, he was elected to the chair of Hebrew at the Collège de France; but his inaugural lecture made him, through its too free handling of theological matters, so obnoxious to those in power, that his course was first suspended, and finally his professorship was taken from him. His work, *La Vie de Jésus*, forming Part I. of his *Origines du Christianisme*, occasioned a great stir in Europe and the United States. Its eloquent and lofty tributes to certain aspects of Christ's character are based on a purely naturalistic philosophy concerning his place and work in history. An abstract of it, in much more popular form, was published by him under the title *Jésus. Histoire des Apôtres* (1866), *Saint Paul* (1869), *Antichrist* (1873), *Les Évangiles* (1877), *L'Église Chrétienne* (1879), and a vol on the reign of Marcus Aurelius, complete the series. Other works are: *Études d'Histoire Religieuse* (1856), *Essais de Morale et de Critique* (1859), *La Réforme Intellectuelle et Morale* (1872), *Dialogues et Fragments Philosophiques* (1876), *Mélanges d'Histoire et de Voyages* (1878), the Hibbert Lectures (1880), delivered in London, his curious poem *Caliban* (1878), and his autobiographical *Souvenirs* (1883); *Feuilles détachées* (1892). R. was elected a member of the Academy 1878. He was master of a fine literary style, and his writings have unusual charm for the cultivated mind. When his *Life of Jesus* first appeared, so charming was its literary form and so wide its range of learning, that many Christians greatly feared its results; but it has long since ceased to be regarded as a dangerous attack. With all his knowledge he lacked the religious temperament and the scientific instinct.

RENARD, n. *rèn'ërd* [F. *renard;* OF. *regnard*—from OHG. *reginhart*, hard or good of counsel—from *regin, ragin*, counsel; *hart*, strong]: a fox, usually so named in fables; written also REYNARD.

RENASCENT, a. *rē-năs'sĕnt* [L. *renas'cens* or *renascen'tem*, being born again—from *re*, again; *nascor*, I am born: It. *rinasc'nte;* F. *renaissant*, new-born, born again]: springing or rising into being again. RENAS'CENCE, n. *-sĕns*, or RENAS'CENCY, n. *-sĕn-sĭ*, state of being produced again: see also RENAISSANCE. RENAS'CIBLE, a. *-sĭ-bl*, that may spring again into being.

RENAVIGATE, v. *rē-năv'ĭ-gāt* [*re*, again, and *navigate*]: to navigate again.

RENCOUNTER, n. *rĕn-kown'tĕr* [F. *rencontre*, an accidental meeting—from L. *re*, again: OF. *encontrer*, to meet—from F. *en*, L. *in*, into; *contra*, against]: a casual meeting in opposition or contest; a dash or clash; a shock; a sudden contest—a very usual spelling is in the French form, RENCONTRE, *răng kŏng'tr:* V. to meet unexpectedly, whether friend or foe; to fight hand to hand. RENCOUN'TERING, imp. RENCOUNTERED, pp. *-tĕrd.*—SYN. of 'rencounter, n.': fight; conflict; collision; clash; combat.

REND, v. *rĕnd* [AS. *rendan*, to tear: O. Fris. *renda*, to tear, break]: to separate or part with violence; to lacerate; to force asunder; to sever; to split. REND'ING, imp. RENT, pt. pp. *rĕnt:* N. a tear; an opening caused by a forcible division. REN'DER, n. *-dĕr*, one who rends.—SYN. of 'rend': to tear; burst; crack; split; break; breach; rupture; fracture; lacerate.

RENDER, v. *rĕn'dĕr* [F. *rendre*—from mid. L. *rendĕrĕ* for L. *reddĕrĕ*, to give up, to yield—from *re*, back or again; *dărĕ*, to give: It. *rendere*, to restore, to render]: to return; to restore; to surrender; to give up; to inflict, as retribution; to give in or deliver, as an account; to assign, as a reason; to cause to be; to invest with qualities; to translate; to give or afford, as assistance: in *OE.*, to represent; to exhibit; to show; to give: N. in *OE.*, a surrender. REN'DERING, imp.: N. a version or translation; a first coat of plaster on a wall. REN'DERED, pp. *-dĕrd.* REN'DERER, n. *-ĕr*, one who renders. REN'DERABLE, a. *-ă-bl*, that may be rendered.—SYN. of 'render, v.': to return; pay back; restore; give back; surrender; yield; give up; afford.

RENDEZVOUS, n. *rĕn'dē-vō* or *răng'dē-vō* [F. *rendezvous*, a rendezvous—*lit.*, give yourselves up or show yourselves—from *rendre*, to give up (see RENDER)]: a place of meeting; an appointed place of meeting or assembling, as for troops or ships: V. to bring together at a particular place. REN'DEZVOUS'ING, imp. *-vō'ĭng.* REN'DEZVOUSED', pp. *-vōd'.*

RENDITION, n. *rĕn-dĭsh'ŭn* [Sp. *rendicion*, rendition, yielding—from L. *redditiōnem*, a giving back or up; *reddĕrĕ*, to give up (see RENDER)]: the act of yielding possession; surrender.

RENDSBURG, *rĕndz'bûrch:* town in the Prussian province of Schleswig-Holstein, at the junction of the Eider and the Kiel canal, 67 m. N.N.W. of Altona. It has an active trade. Pop. (1880) 12,776; (1890) 13,195.

RENÉ, *rĕh-nā'*, or RENATUS, *r-n-t-s*, I. ('the Good'), titular King of Naples and Sicily, 1408–80; b. Angers; son of Louis II., Duke of Anjou and Count of Provence. R.'s paternal grandfather, Louis I., Duke of Anjou, second son of John the Good, King of France, had been adopted 1380 by Joanna I., Queen of Naples, as her successor; and on his death, his son, R.'s father, was crowned King of Naples and Sicily. But this recognition of his presumed rights was merely nominal, and when, on his death and that of his eldest son, Louis II., R., as the next heir, endeavored to make good his pretensions to the great Neapolitan heritage he found himself involved in disastrous disputes with numerous other aspirants. R. had married Isabella of Lorraine, and through her was also a claimant of the rich territories of Lorraine, which brought on him the enmity of his wife's brother-in-law, the Duke of Burgundy, who laid equal claim to the heritage of the ducal House of Lorraine. When, 1442, R.'s powerful rival, Alfonso of Aragon, took Naples after a protracted siege, R. perceived that the struggle was virtually decided, and retired to his hereditary dominions in Provence, and thenceforth occupied himself with the administration of his territories and with the cultivation of poetry and painting. In 1445 R. gave his beautiful daughter Margaret in marriage to Henry VI. of England, and at the same time obtained from his royal son-in-law the restitution of Anjou and Maine, which had remained in the hands of the English since the successful wars of Henry V. This did not, however, prevent R. from taking part in the wars of Charles VII. against the English 1449; but R., wearied with war, retired to Aix in Provence, where he attracted to his court the cultivators of song and romance, encouraged manufactures, and introduced improved methods of agriculture. Among his subjects, the memory of 'the good King René' was long held in great veneration. R.'s sons had died before him; and as with him the House of Anjou became extinct, its territorial dominions lapsed to the French crown.

RENEGADE, n. *rĕn'ē-gād*, or RENEGA'DO, n. *-gā'dō* [Sp. *renegado;* It. *rinnegato;* F. *renégat*, an apostate—from L. *re*, back or again; *negare*, to deny]: an apostate; one who renounces his faith; a deserter.

RENEGE, v. *rē-nēj'* [mid. L. *renegāre*, to deny—from L. *re*, back or again; *negare*, to deny]: in *OE.*, to deny. RENEG'ING, imp. RENEGED', pp. *-nējd'*.

RENERVE, v. *rē-nerv'* [*re*, again, and *nerve*]: to give new vigor to.

RENEW, v. *rē-nū'* [*re*, again, and *new:* Ger. *erneuen*, to renew, to renovate]: to make new; to restore to a former good state; to repair; to rebuild; to revive; to begin again, as a course; to grant again or repeat, as a loan or a bill; to transform to a new life; to make again, as a treaty. RENEW'ING, imp.: N. act of making new; renewal. RENEWED', pp. *-nūd:* ADJ. repaired; re-established; repeated; revived. RENEW'ER, n. *-ėr*, one who renews. RENEW'ABLE, a. *-ă-bl*, that may be renewed. RENEW'AL, n. *-ăl*.

act of forming anew; revival; restoration to a former good state; repetition of a loan, or the same bill; renewal of a bill of exchange is matter of agreement between the parties, and a new bill is granted in substitution for the old one by the party liable to pay—with the result of suspending the former bill in its operation till the renewed one arrives at maturity. RENEW'EDNESS, n. *-ĕd-nĕs*, the state of being renewed.

REN'FREW: ancient royal, parliamentary, and municipal burgh, cap. of the county of R., Scotland; on the s. bank of the Clyde, 6 m. w.n.w. of Glasgow. It contains an educational institution, the Renfrew Grammar School and Blythswood Testimonial, originally endowed by charter of Robert III. The Glasgow steamers touch here. Silk and muslin fabrics are woven; and many of the inhabitants are employed in iron-works and in ship-building, which industries have become important. Pop. (1871) 4,163; (1881) 5,115; (1891) 6,756.

RENFREW, *rĕn'frū* (anciently *Strathgryffe*): county in Scotland, 31 m. long, 13 br ad; bounded n. and w. by the river and Firth of Clyde, s by Ayrshire, e. and n. by Lanarkshire; 254 sq. m., or 162,428 acres; pop. (1861) 177,561; (1871) 216,947; (1881) 263,274; (1891) 290,790.

R. is very unequal in its surface, and consequently in the nature of its soil; the highest portion, composing two-thirds of its surface, reaches the height of 1,711 ft. above sea-level, and gradually declines to a plain of about 12,000 acres. R. was divided 1815 into the Upper and Lower Wards. Nearly two-thirds of the arable land is kept under grasses. There are extensive mineral deposits, constituting a great source of commerce and wealth. The minerals wrought are coal (accompanied always by iron), limestone, and sandstone. In commercial and manufacturing importance, R is second only to Lanark of Scotch counties. The manufacture of silk, cotton, and muslin fabrics is extensive. The centre of these branches of industry is Paisley; but weaving is carried on in almost every village in the county. The good roads and railways, with the seaports of Greenock and Port Glasgow, afford ready transit both for home and foreign trade. The chief towns, besides these ports, are Renfrew (q.v.), Paisley (q.v.), and Johnstone (q.v.). Besides the Clyde, and some small streams, there are three rivers, called the Black Cart, the White Cart, and the Gryffe. Of the whole acreage of R. there were, 1880, 94,339 acres under all kinds of crops: 17,712 acres under corn crops, 8,494 under green crops, 18,321 in clover and grasses under rotation, and 49,467 in permanent pasture. There were in the county in the same year 2,300 horses kept for agricultural purposes, 25,049 cattle, 31,237 sheep, and 1,310 pigs. The valuation for 1884-5 was £708,298, exclusive of railways and public works, valued at £85,023.

R. was the chief patrimony of the Stewards of Scotland, granted to them 1404 by Robert III., since which time the eldest son of the reigning sovereign has borne the title of Baron of Renfrew.

RENI, *rē'nē:* town of Bessarabia, at the confluence of the Pruth and the Danube, on the left bank of both rivers. It carries on a considerable trade, exporting large quantities of grain. Pop. about 8,000.

RE'NI, GUIDO: see GUIDO RENI.

RENIER, *rā-nē-ā'*, CHARLES ALPHONSE LÉON: archæologist: 1809, May 31—1885, June 13; b. Charleville, France. He was a close student, and in early life became famous; founded the *Revue of Philology, Literature, and Ancient History* and was ed. of *Courtin's Modern Encyclopedia*, 30 vols.; collected Roman inscriptions in Algeria and France for the Historical Soc., was director of the Sorbonne Library; and, 1861, became prof. of Roman antiquities in the College of France. He was a member of several learned societies, translated various ancient works, and wrote largely on antiquarian subjects. He died at Paris.

RENIFORM, a. *re'ni-fawrm* [L. *renes*, the kidneys or reins: *forma*, shape]: kidney-shaped; in *geol.*, applied to concretions of ironstone, limestone, etc., which have a flattish, oblong, or kidney shaped form; in *bot.*, resembling the longitudinal section through a kidney: see also RENAL.

RENNEL, *rĕn'el*, JAMES, English geographer: 1742, Dec 3—1830, Mar. 29; b. near Chudleigh, Devonshire. He entered the navy as midshipman at the age of 15, but at the age of 24 he left the navy, and enlisted as an officer of engineers in the E. India Company's army, rising under Clive to the grade of major, and afterward was transferred to the post of surveyor-gen. of Bengal. While in the army, he had prepared and published a *Chart of the Bank and Currents of Cape Agulhas* (1768), and having retired from office (1782) with a pension of £600, he published a succession of geographical works on India, chief of which was *Memoirs of a Map of Hindostan* (Lond. 1783; new editions 1788, 93, and 1800). In 1792 he published *Memoir of the Geography of Africa*; 1798 he illustrated Mungo Park's travels by a map. The correctness of the ancient geographers being at that time much discussed, R. undertook the vindication of Herodotus, whose works he read in a translation), and published 1800 his *Geographical System of Herodotus Examined and Explained*, a fine combination of acuteness, sagacity, and research (2d ed. 1830). In 1814 appeared his *Observations on the Topography of the Plain of Troy;* and two years afterward, *Illustrations (chiefly Geographical) of the Expedition of the Younger Cyrus, etc., and of the Retreat of the Ten Thousand*. After his death, at London, there were found among his papers the *Investigation of the Atlantic Currents and those between the Atlantic and Indian Oceans* (Lond. 1832), compiled from a thorough examination of the logs of ships for about 40 years previous; and a *Treatise on the Comparative Geography of Western Asia*, with an atlas, anc. and modern (Lond. 1831), prepared by the royal command, and the publication partially defrayed at the king's expense. R. was one of the most remarkable men of his time; his works evince perseverance, industry, and rare sagacity.

RENNES, *rĕn* (*Redones* of the Romans, *Condate* of the Gauls): formerly cap. of the province of Bretagne, now the chief town of the dept. of Ille-et-Vilaine, is situated at the confluence of the rivers Ille and Vilaine, France. It is divided into the upper or new town, and the lower or old town. It is surrounded by ancient walls, flanked with towers, beyond which lie extensive suburbs. Three bridges unite the two divisions of the town, the older portions of which are on the left bank of the Vilaine, and are exposed to damage from inundations. The most noteworthy of the public buildings are the modern cathedral, whose interior is a very spacious hall of Grecian architecture; the stately Palais de Justice; the Hôtel de Ville; and the Lycée. R. is the see of a bishop, and the seat of a high court of jurisdiction for Ille-et-Vilaine and several adjacent depts., and has tribunals of first instance and of commerce. As the focus of main and branch lines of railway between Paris and the n.w. of the empire, and commanding good river and canal navigation, R. is favorably situated for commerce; and in addition to the transport of the abundant farm-produce of the neighboring districts, it carries on considerable trade in its own manufactures, which include cotton and linen yarns, flannel stockings, lace, sail cloths, earthenware, etc. R. was almost reduced to ashes by a great fire, 1720. Pop. (1881) 60,974; (1891) 69,232.

RENNET, n. *rĕn'nĕt* [F. *reinette*, a little queen—from *reine*, a queen]: a class of apples, including many of the most beautiful and pleasant varieties. They are of regular and globose shape; their skin has generally a rusty tinge, and often a kind of unctuousness to the touch; their flesh is finely granular; and besides being sweet and agreeably acid, they have a peculiar aromatic flavor. They do not keep well. The trees have a very regular habit of growth, and are suitable for dwarf standards.

RENNET, n. *rĕn'nĕt*, or RUNNET, n. *rŭn'nĕt* [Ger. *rinnen*, to run, coagulate; *rennse*, rennet: AS. *gerunnen*, curdled: Dut. *runnen*, to curdle; *runsel*, rennet]: the prepared inner membrane of the true stomach (see DIGESTION) of the sucking-calf; used for coagulating milk, and depending for its use on the acid gastric juice contained in it. It is prepared by removing the stomach from the animal as soon as killed, and scraping off the outer skin and all superfluous fatty matter. The membrane is then salted for some hours, and stretched out to dry. If perfectly dried, it will keep for a long time. When used, a small piece is taken and soaked in a little whey or water, and then added to the milk intended to be curdled.

RENNIE, *rĕn'ĭ*, GEORGE: English civil engineer: 1791, Jan. 3—1866, Mar. 30; b. Surrey; eldest son of John R. At the age of 16 he entered the Edinburgh Univ., and after a course of classics, mathematics, chemistry, and nat. philosophy, he returned to London 1811, and commenced the practical study of engineering under his father. In 1818, he was appointed supt. of the machinery of the Mint, and

at the same time aided his father in planning and designing several of his later works. After his father's death 1821, R. entered into partnership with his younger brother, John (afterward Sir John R.), as engineers and machinery constructors. The firm did an immense business, including the execution of most of the works planned by the elder R., and the completion of those which he had left unfinished. Their operations included construction of bridges, harbors, docks, ship-yard and dredging machinery, steam-factories, in Great Britain and on the continent, and many of the great naval works at Sebastopol, Cronstadt, Odessa, Nicolaiev, and in the principal ports of England: they made the coining machinery for the mints at Calcutta, Bombay, Lisbon, Mexico, and Peru; the biscuit, chocolate, and flour mills at Deptford, Gosport, and Plymouth; and furnished marine engines for the war ships of England, Russia, France, Italy, Mexico, etc. Besides these multifarious labors, they built ships of wood and iron, drained large tracts of land in the midland counties of England; and R. superintended the construction of several continental railways. He was elected a fellow of the Royal Society 1822. He is the author of 'Experiments on the Strength of Materials,' 'The Frictions of Solids,' and 'The Frictions of Fluids,' in the *Philosophical Transactions*.—His brother, Sir JOHN (1794-1874), was knighted on the opening of the new London Bridge (1831), which he executed from his father's designs. He designed and executed Southwark and Waterloo bridges; and completed the drainage of the Lincolnshire coast, begun by his father. See his *Autobiography* (1875).

RENNIE, JOHN: English civil engineer: 1761, June 7—1821, Oct. 16; b. at Phantassie, near East Linton, E. Lothian, Scotland. His preliminary education was obtained at the parish-school of E. Linton, and supplemented by two years at Dunbar, where he was taught pure mathematics. At Edinburgh he attended lectures on nat. philosophy by Dr. Robison, and on chemistry by Dr. Black (q.v.). In 1780 he was taken into employment at the works of Boulton and Watt, at Soho, near Birmingham. Here his mechanical genius soon showed itself; and so highly did Watt esteem R., that he gave him, 1789, sole direction of the construction and fitting-up of the machinery of the Albion Mills, London; and the ingenious improvements effected in the connecting wheel-work were so striking, that R. at once rose into general notice as an engineer. Abundance of mill-work flowed in on him, and the thorough efficiency of his workmanship increased his fame. To this branch of engineering he added, about 1799, the construction of bridges. The elegance and solidity of his constructions, the chief of which were at Kelso, Leeds, Musselburgh, Newton-Stewart, Boston, New Galloway (with other places afterward mentioned), were universally admired. R.'s greatest work in this department was the Waterloo Bridge over the Thames, said to be the noblest structure of its kind in the world, and certainly combining in the happiest proportions the qualities of grandeur and simplicity. It

was commenced 1811, and finished in less than six years, at a cost of more than £1,900,000. Another of his works is the Southwark Bridge, built on a new principle, cast-iron arches resting on stone piers; finished in four years at an expense of £800,000. He also drew up the plan for the London Bridge, which was not commenced till after his death. He superintended the construction of several canals, chief of which was the Kennet and Avon canal between Newbury and Bath. The London Docks, the E. and W. India Docks at Blackwall, the Prince's Dock at Liverpool, and others were designed, and wholly or partially executed under his superintendence. He also planned many improvements on harbors and on the dockyards of Portsmouth, Chatham, Sheerness, and Plymouth; executing at Plymouth the most remarkable of all his naval works, the celebrated Breakwater. R.'s great merit as engineer consisted in his almost intuitive perception of what was proper to be done to effect the assigned purpose. Another striking characteristic of his works is the remarkable combination in them of beauty and durability. In this respect, R. had no rival; and though his works are frequently objected to on the ground of expensiveness, yet their lasting qualities will in the end more than compensate for this. In person, R. was of extraordinary stature and herculean strength—characteristics which have distinguished his family.

RENO, *rē'nō*, Jesse Lee: soldier: 1823, June 20—1862 Sep. 14; b. Wheeling, W. Va. He graduated from West Point 1846; was in the principal battles of the Mexican war, and at Cerro Gordo and Chapultepec rendered distinguished service, for which he was brevetted first lieut. and capt. respectively. He taught for a while at West Point, was connected with the ordnance board at the Washington arsenal, 1851–53, afterward made surveys in Minnesota, was chief of ordnance in Utah, and was commander of the Mount Vernon, Ala., arsenal for some time previous to its capture by the Confederate forces 1861. He was promoted brig.gen.vols. 1861, and maj.gen.vols. 1862, commanded a brigade in Gen. Burnside's N. C. expedition, and led the 9th army corps at Manassas and Chantilly. This brilliant officer was killed while leading this corps in an assault at the battle of South Mountain.

RENOUNCE, v. *rē-nowns'* [L. *renunciārĕ*, to retract, to renounce—from *re*, back or again; *nuncio*, I make known; *nuncius*, a messenger: It. *rinunziare:* F. *renoncer*]: to disown; to repudiate; to reject; to give up; to refuse to acknowledge or own; to abandon; in *card-playing*, not to follow a suit when a person has a card of the same sort; to revoke; N. act of renouncing. Renoun'cing, imp.: N. act of disowning or rejecting. Renounced, pp. *rē-nowncst'*. Renoun'cer, n. *-sĕr*, one who renounces. Renounce'ment, n. *-mĕnt*, the act of disclaiming or rejecting.—Syn. of 'renounce, v.': to disown; abandon; forsake; abdicate; resign; forego; cast off; disavow; disclaim; abjure; deny; recant; quit; relinquish; give up; repudiate; revoke; abnegate.

RENOVATE, v. *rĕn'ō-vāt* [L. *renovātus*, renewed, restored—from *re*, again: *novo*, I make new; *novus*, new. It. *rinovare*]: to renew; to refresh: to restore to the first state, or one resembling it. REN'OVATING, imp.: ADJ. renewing, restoring. REN'OVATED, pp.: ADJ. made new, fresh, or vigorous. REN'OVATER, or REN'OVATOR, n. *-vā-tẽr*, he or that which renovates. REN'OVA'TION, n. *-vā'shŭn* [F.—L.]: the act of renewing after decay; state of being renewed; renewal.

RENOWMED, a. *rĭ-nowmd'*: OE. for RENOWNED.

RENOWN, n. *rĭ-nown'* [OF. *renon;* F. *renom, renommée*, renown, fame: Sp. *renombre*, a surname, renown—from L. *re*, again; *nōmen*, a name]: widespread reputation; fame; celebrity. RENOWNED', a. *-nownd'*, famous; celebrated; remarkable. RENOWN'EDLY, ad. *-ĕd-lĭ*. RENOWN', v. in *OE.*, to make famous.—SYN. of 'renowned': distinguished; noted; eminent; celebrated; wonderful; remarkable; famed; famous.

RENSSELAERITE, n. *rĕns'sē-lẽr-īt* [after Stephen Van *Rensselaer*]: a steatitic mineral with a fine compact texture, and variously colored, worked in the lathe into inkstands and other articles.

RENSSELAER POLYTECHNIC INSTITUTE, *rĕns'sē-lẽr pŏl-ē-tĕk'nĭk*: at Troy, N. Y.; founded by Stephen Van Rensselaer 1824 as a school of theoretical and practical science; incorporated 1826; reorganized on the basis of a general polytechnic institute 1849. The buildings comprise the main hall, 115 x 50 ft., 4 stories high, containing recitation, lecture, and drawing rooms, natural history cabinets, and the library; Winslow laboratory, 70 x 40 ft., 3 stories high, named after a former pres. of the institute, containing the metallurgical and chemical laboratories, and recitation, lecture, and apparatus rooms; Williams Proudfit observatory, 30 ft. sq., 2 stories high in centre, with n., s., and e. wings, total length, 76 ft., width 60 ft.; Ranken house, occupied by the department of mechanics; and gymnasium, 80 x 44 ft., supplied with improved apparatus and a variety of baths. In 1885 the course of study, civil engineering only, was supplemented by a course in natural science, both courses being identical during the first 2 years, and the latter comprising more natural history, chemistry, and geology, and less of higher mathematics than the former course in the last 2 years. In 1894 the institute had 17 instructors, 188 students, and 5,000 vols. in its library. The institute has had the following presidents: Samuel Blatchford, D.D., 1824-28; John Chester, D.D., 1828–9; Eliphalet Nott, D.D., LL.D., 1829-45; Nathan S. S. Beman, D.D. 1845-65; John F. Winslow, 1865-68; Thomas C. Brinsmade, M.D., 1868; James Forsythe, LL.D., 1868–86; John Hudson Peck, LL.D., 1888.

RENT: pt. and pp. of REND, which see.

RENT, n. *rĕnt* [F. *rente;* Sp. *renta;* It. *rendita*, revenues, yearly rents—from L. *redditus*, given back, restored; *reddĕre*, to restore—from *re*, back; *dare*, to give]: revenue; annual payment; the yearly sum paid by an occupier or lessee to a proprietor (see below: also LANDLORD AND TENANT): V. to hold or occupy by the payment of a yearly sum; to lease or let for an annual payment. RENT'ING, imp. RENT'ED, pp. RENT'ER, pp. *-er*, one who rents; a tenant. RENT'ABLE, a. *-a-bl*, that may be rented. RENTAL, n. *rĕnt'al*, a list or account of rents; the whole rents of an estate. RENT-CHARGE, a yearly charge upon an estate, granted or secured by deed. RENT-ROLL, a schedule or list of rents payable at stated times.

RENT, n. *rĕnt* [see REND]: a tear; a fissure; a schism. —SYN.: rupture; tear; laceration; break; fracture; breach; fissure.

RENT, *rĕnt*, in Political Economy: term applied to the profits drawn from land, houses, or other immovable property, often called 'real estate.' It is colloquially applied to these profits only when the property is hired by a tenant who pays for the use of it. It was long before a distinction was made between such letting and hiring and that of any other commodity, such as a ship or a wagon. But political economists found that there was a fundamental distinction, affecting large questions not only in political economy but in state politics. These are connected with the specialty that other profits, whether from the letting of articles or otherwise, arise out of the acts of those to whom the articles belong; but the rent of land is a fund that exists through external causes, over which the owner has no control, and in certain conditions *must* exist whoever may draw it. When 'the theory of rent,' as it was termed, dawned upon the economists, and was but partially seen, they developed it in different formulas, which appeared to be different theories, but in reality were crude forms, tending, though complicated in themselves, to the simple principle, that the pressure of population on the means of subsistence creates rent on those lands where the means of subsistence can most easily be produced. In an enlarging and aggrandizing country, the phenomenon is in constant gradual operation; but it will be best illustrated by supposing an instance of sudden and extensive action. Suppose there is an island in which 1,000 people find enough for their wants in the natural produce of its most fertile soil. Suddenly 500 people become added to the population, and an increase of the existing food to the extent of one-half is required. The shape in which this increase will take place will be competition, by offer of an enhanced price for food, and that enhanced price will tempt people to bring under cultivation the inferior lands. The owners, however, of the old rich lands will not see their neighbors getting prices a third higher than themselves; they, too, will sell their produce at the market price, and the difference between this and the old value will be *rent*. It is of no moment, in the economic question of the existence of the element, that the owner of the rich soil does not let it; if he

eats his bread cheaper than his neighbor, that is merely the form in which he derives the advantages of *rent*. The importance of this view, both in politics and economics, is that rent *must exist, and cannot be got rid of*. Whoever has at his command better land than the worst that is cultivated holds rent. It is in vain, therefore, to think of destroying the 'monopoly,' as it is sometimes called, of landowners; it revives as naturally by an economic law, as water finds its level by a physical law. If you were to divide all the land in the country to-morrow in equal portions among the inhabitants, the value of it would be greatly deteriorated by the change, but in time some patches would become more valuable than others, and worth 'rent,' while the frugal and industrious would gradually be absorbing the portions of the idle and extravagant, and accumulating estates. In fact, to the mere consumer, it is of no moment who has the land, provided it is in the hands that can render it most productive. To this end, it is more profitable that the land of a country should be in the market and obtainable by those who, being ready to give most for it, are able to work it to most profit. In France, where land is divided among the owner's descendants, the consequent breaking up into small patches, not necessarily in the hands of persons able or willing to cultivate them, is detrimental to the value of the land at large.

RENTE, n. *rängt* [F.]: yearly income; shares; French government stock. RENTIER, n. *rang'ti-a*, one who has an income from land or stocks; a proprietor.

RENTER, v. *rent'ėr* [F. *rentraire*, to fine-draw—from *re*, back; *en*, in; *traire*—from L. *trahere*, to draw]: to fine-draw; to sew together two edges of cloth so finely that the seam is scarcely visible; to work new warp into a piece of damaged tapestry, and so restore it. RENT'ERING, imp. RENTERED, pp. *-erd*. RENT'ERER, n. *-er-er*, a fine-drawer.

RENTON, *rėn'ton*: small town in the county of Dumbarton, and two m. n. of the town of Dumbarton, on the right bank of the Leven. Smollett, novelist and historian, was born in the neighborhood, and is commemorated by a monument in the town. Pop. (1881) 4,319; (1891) 5,458.

RENUMERATE, v. *re-nu'mė-rāt* [*re*, again, and *numerate*]: to recount.

RENUENT, a. *rė'nū-ent* [L. *renuens*, pp. of *renuo*—from *re*, back; *nuo*, I nod]: throwing back the head; applied specifically to two muscles which perform this function.

RENUNCIATION, n. *rė-nun'si-ā'shun* [see RENOUNCE.]: act of renouncing; disavowal; denial; abandonment; in *law*, the abandonment of a right.—SYN.: disavowal; rejection; recantation; abjuration; relinquishment; renouncement; disownment; disavowment; disclaimer.

RENVERSE, a. *rėn-vėrs'* [F. *renverser*, to throw down—from *re*, back; *en*, in; L. *versari*—from *verto*, to turn]: in *her.*, reverse; set with the head downward or contrary to the natural position: V. in *OE.*, to reverse; to overthrow. RENVERSE'MENT, in *OE.*, the act of reversing.

RENWICK, *rĕn'wĭk*, JAMES, LL.D.: American physicist: 1790, May 30—1863, Jan. 12; b. Liverpool, England, on his parents' journey home from Scotland: his mother was daughter of a Scotch clergyman named Jeffrey, and was a noted beauty to whom Burns gave poetic tribute in some of his songs. R. graduated at Columbia College, New York, 1807. In 1820, he was appointed prof. of chemistry and physics in that college, holding the office till 1854. In 1838, he was appointed by the U. S. govt. one of the commissioners to explore the boundary, then settled by the Ashburton treaty, between Maine and New Brunswick. In addition to his collegiate duties, he wrote the biographies of Robert Fulton, David Rittenhouse, and Count Rumford, in Sparks's *American Biography; Memoir of De Witt Clinton* (1834); *Treatise on the Steam-engine* (1840–1); *Elements of Mechanics* (Phil. 1832); beside many translations, reviews, articles in periodicals, etc. His text-books, *Outlines of* Natural *Philosophy* (1832), and *Outlines of Geology* (1838), were the first works of their kind published in the United States, and, with his other educational works, have passed through numerous editions.

REN WICK, JAMES: 1818, Nov. 3–1895, June 23: architect; b. N.Y.; son of James R. He graduated from Columbia College 1836, became a civil engineer, and was employed by the Erie Railroad Company, was supt. of the construction of the reservoir at Fifth avenue and Forty-second street, New York; but soon turned his attention to architecture. Among the buildings in New York for which he made the designs are Grace Church, the Rom. Catholic Cathedral, the Church of the Covenant (Presb.), Booth's Theatre, and the Young Men's Christian Association building. He also planned many fine buildings in other cities, including the Corcoran Gallery at Washington.

REOBTAIN, v. *rē-ŏb-tān'* [*re*, again, and *obtain*]: to obtain again. RE'OBTAIN'ABLE, a. capable of being obtained again.

REOCCUPY, v. *rē-ŏk'kū-pī* [*re*, again, and *occupy*]: to occupy again.

REOPEN, v. *rē-ō'pn* [*re*, and *open*]: to open again.

REOPPOSE, v. *rē'ŏp-pōz'* [*re*, again, and *oppose*]: to oppose again.

REORDAIN, v. *rē'ŏr-dān'* [*re*, again, and *ordain*]: to ordain again.

REORDER, v. *rē-ŏr'dĕr* [*re*, again, and *order*]: to order a second time.

REORGANIZE, v. *rē-ŏr'găn-īz* [*re*, and *organize*]: to reduce again to a regular body, or to a system. REOR'GANIZA'TION, n. the act of organizing anew.

REP, or REPP, a. *rĕp* [a corruption of *rib:* comp. F. *reps*]: having the surface of a cord-like or ribbed appearance—applied to a certain style of fabrics: N. a fabric having a corded or ribbed appearance.

REPACIFY, v. *re-pas'i-fi* [*re*, again, and *pacify*]. to pacify again.

REPACK, v. *rē-pak'* [*re*, again, and *pack*]. to pack a second time.

REPAID, v. *rē-pad'*; pt. and pp. of REPAY, which see.

REPAINT, v. *rē-pānt'* [*re*, again, and *paint*]: to paint anew.

REPAIR, v. *rē-pār'* [F. *réparer*, to repair—from L. *reparāre*, to restore, to renew—from *re*, again; *parro*, I make or get ready. It. *riparare*]: to restore to a good state after decay or injury; to fill up anew, as a breach or rent; to mend; to make amends for, as for an injury: N. restoration after decay, waste, or injury, supply of loss (see REPAIRS). REPAIR'ING, imp.. N. the act of restoring after injury or dilapidation. REPAIRED', pp. *-pārd'*. REPAIR'ER, n. *-ėr*, one who repairs. REPAIR'MENT, n. *-ment*, act of repairing. —SYN. of 'repair, v.': to restore; recover; amend; renew; mend; retrieve; recruit.

REPAIR, v. *rē-pār'* [F. *repaire*, a lodging, a haunt; *repairer*, to haunt, to frequent: mid. L. *repatriārē*, to go home again—from L. *re*, back; *patria*, a fatherland—from *pater*, a father]: to resort to; to betake one's self; to return, as to one's house; to resort: N. in *O.E.*, a haunt or resort. REPAIR'ING, imp. REPAIRED', pp. *-pārd'*.

REPAIRS': technical and common term to denote the repairs made by a landlord or tenant in the building leased. What are 'necessary repairs,' has been the subject of much litigation but the term is now generally held to include everything necessary to keep the premises in tenantable order; but the extent of the R. is generally to be measured by the age and class of buildings. There is an erroneous popular notion that the duty to make R. belongs to the landlord; but in the absence of a covenant or an express agreement on the part of the landlord to make R., the tenant is bound to repair; the obligation of a landlord to repair rests solely on an express contract so to do, and no agreement to repair on his part will be implied or enlarged by construction; and in the absence of an agreement or of some statutory provision, not even in case the premises are destroyed by fire, is the landlord bound to rebuild or to repair; and the destruction or untenantability caused by the fire will be no excuse for the non-payment of rent. But this last harsh rule of the common law has now been abolished by statutory provisions in most of the states, by which the rent ceases in case the building is destroyed or made untenantable and unfit for occupancy by the elements without fault or neglect on the part of the tenant, and the lessee may quit and surrender the premises: also it has been held that a covenant to repair means to rebuild. While the landlord is under no obligation to make R., yet if he undertakes to make them, he is bound to make them properly and skilfully, otherwise he renders himself liable for the injuries occasioned to his tenant by his negligent R. Unless the landlord reserves the right to enter the premises to make R., he is guilty of trespass if he does so, even

though the lessee covenanted to make the R. but refused to do so. When the landlord covenants to make R. and then refuses to do so, the tenant, after notice to the landlord, may make them himself and recover the expense thereof from the landlord; or he may leave the premises unrepaired and recover from the landlord the damages sustained by reason of breach of the covenant to repair. The remedy of the landlord for a breach of the tenant's covenant to repair is an ordinary action for damages for a breach of the covenant, or a Re-entry (q.v).

Repand Leaf of *Solanum nigrum.*

REPAND, a. *rē-pănd* [L. *repan'dus*, bent backward, turned up—from *re*, back; *pandus*, bent, crooked]: in *bot.*, applied to a leaf when its margin is undulated, and unequally dilated; strictly, applied to a leaf whose margin is toothed with concave intervals between the teeth. REPAN'DOUS, a. *-păn'dŭs*, bent or curved backward.

REPARATION, n *rèp'à-rā'shŭn* [F. *réparation*—from L. *reparatiōnem*, restoration, renewal - from L. *reparārĕ*, to restore, to renew: Sp. *reparacion*, reparation (see REPAIR 1)]: the act of restoring to a good state; supply of what is wasted; renewal; satisfaction or compensation for injury; amends. REPARABLE, a. *-rà-bl*, that may be repaired, amended, or restored. REPARABLY, ad. *-blĭ*. REPARATIVE, a. *rè-păr'a-tĭv*, that amends defects; that repairs or makes good: N. that which repairs.—SYN. of 'reparation': restitution; repair; compensation; amends; restoration;—of 'reparable': recoverable; retrievable; restorable.

REPARTEE, n. *rèp'ar-tē'* [F. *repartie*, a reply—from *repartir*, to return quickly a thrust or a blow, to reply —*lit.*, to redivide; *re*, again; *partir*, to divide—from L. *pars* or *partem*, a part]: a smart, ready, and witty reply; a retort.

REPASS, v. *rē-pâs'* [*re*, back or again, and *pass:* F. *repasser*]: to pass or travel back.

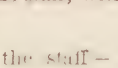
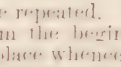
REPASSANT, a. *rē-păs'ant:* in *her.*, term applied when two lions or other animals are borne going contrary ways, one of which is passant, by walking toward the dexter side of the shield in the usual way, and the other repassant by going toward the sinister.

REPAST, n. *rē-pâst'* [OF. *repast;* F. *repas*—from mid. L. *repastus*, a repast—from L. *re*, again; *pastus*, food—from *pascor*, I feed]: a meal; food taken; victuals: V. in *OE.*, to feed; to feast. REPAS'TURE, n. *-tūr*, in *OE.*, entertainment.

REPAY, v. *rē-pā'* [*re*, back, and *pay*]: to pay back, as money; to refund; to reimburse; to recompense; to requite. **Repay'ing**, imp. **Repaid'**, pp. *-pād'*. **Repay'able**, a. *-pā'a-bl*, that may be repaid; that is to be refunded. **Repay'ment**, n. *-ment*, the money repaid.—Syn. of 'repay': to pay back; recompense; compensate; reimburse.

REPEAL, v. *re-pēl'* [F. *rappeler*, to call back—from L. *re*, back; *appello*, I call upon, I speak to]: to revoke; to make void, to abolish; to abrogate: N. the act of annulling or making void; revocation. **Repeal'ing**, imp. **Repealed'**, pp. *-pēld'*. **Repeal'able**, a. *-a-bl*, capable of being repealed or revoked. **Repeal'ableness**, n. *-nes*, capability of being repealed. **Repeal'er**, n. *-er*, one who agitates the repeal of a law, etc.—Syn. of 'repeal, v.': to revoke; rescind; recall; annul; abolish; abrogate; reverse; cancel; void.

REPEAT, v. *rē-pēt'* [F. *répéter*, to repeat—from L. *repetere*, to resume, to renew—from *re*, back or again; *peto*, I seek: It. *repetere*]: to do or utter again; to rehearse; to quote or recite from memory: N. in *music* (see below). **Repeat'ing**, imp. **Repeat'ed**, pp.: Adj. done or spoken again; frequent. **Repeat'er**, n. *-er*, that which repeats—applied to a watch that strikes the hours; in *arith.*, a number or figure of a decimal which is repeated indefinitely. **Repeat'edly**, ad. *-li*, again and again. **Repeating circle**, an instrument for measuring the angular distance of two objects.—Syn. of 'repeat': to iterate; recite; renew; relate; rehearse; recapitulate; reiterate.

REPEAT, in Music: mark indicating repetition of the part or strain to which it applies: it consists of two perpendicular lines through the staff, with dots before them and between the lines of the staff –  placed at the close of the strain to be repeated. When a series of notes has to be repeated from the beginning of the piece, this sign is inserted at the place whence return is to be made to the beginning. But when the repetition is not from the beginning a reversed repeat  must be placed at the point where the repetition begins, the passage to be repeated being inclosed by the two signs. When the following strain also is to be repeated, the dots are placed on both sides of the repeating sign . When a passage of some length is to be repeated, with an alteration at the end, a curved line with the figure 1, *1ma*, or *prima volta* [Ital. first time], is placed over the part to

be altered, the sign of the repeat follows, and then the altered termination with *2, 2da*, or *seconda volta* [Ital. second time], placed over it.

The words *Da Capo*, abbreviated D. C. [Ital. from the beginning], indicate that a piece is to be repeated from the beginning. But if that repetition is to extend only to a particular point, at which the movement or piece finally closes, that point is indicated by the word *Fine* [Ital. end], or the letter F. If, however, the repetition is to begin, not from the commencement of the piece, but from another point, the sign 𝄋 is placed over the point, and the words *dal segno*, abbreviated D. S. [Ital. from the sign], are used to indicate the point after which the repetition is to begin.

REPEL, v. *rē-pĕl* [L. *repellĕrĕ*, to drive or thrust back—from *re*, back; *pello*, I drive: It. *repellere*]: to drive back; to repulse; to check the advance of; to act with force in opposition to force impressed; to resist. REPEL'LING, imp.: ADJ. driving back; resisting approach. REPELLED', pp. *-pĕld'*. REPEL'LER, n. *-ĕr*, he or that which repels. REPEL'LENT, a. *-ĕnt*, able or tending to repel: N. a medicine which drives back morbid humors. REPEL'LENCY, n. *-ĕn-sĭ*, the principle of repulsion.—SYN. of 'repel': to oppose; reject; refuse; repulse; resist.

REPENT, a. *rē pĕnt* [L. *repens* or *repen'tem*, creeping—from *repo*, I creep]: in *bot.*, lying flat upon the ground, and emitting roots along the under surface.

REPENT, v. *rē pĕnt'* [F. *repentir*, to repent—from L. *re*, again; *pœnitĕrĕ*, to cause to repent—from *pœna*, pain: It. *repentere*, to repent]: to feel sorrow or regret for something done or spoken; to express regret for something past; to change the mind; to remember with sorrow; to feel such sorrow for sin as to produce amendment of life. REPENT'ING, imp.: ADJ. grieving for the past; feeling contrition for sins: N. act of repentance. REPENT'ED, pp. REPENT'ANT, a. *-ănt* [F.—L.]: sorrowful on account of past conduct or misdeeds; expressing or showing sorrow for the past. REPENT'ANTLY, ad. *-lĭ*. REPENT'ANCE, n. *-ăns* [F.—L.]: the sorrow for sin which produces newness of life; sorrow for anything done or said. REPENT'INGLY, ad. *-lĭ*.—SYN. of 'repentance': penitence; compunction; contrition; remorse; regret; contriteness.

REPEOPLE, v. *rē-pē'pl* [*re*, again, and *people*]: to people anew; to furnish again with a stock of inhabitants. REPEO'PLING, imp. *-pling*: N. the act of stocking with people anew. REPEO'PLED, pp. *-pld*.

REPERCUSSION, n. *rē per-kush'un* [F. *répercussion*, repercussion—from L. *repercussionem*, a rebounding—from *re*, back or again; *percutere*, *percussum*, to strike or beat: It. *ripercussione*; see PERCUSSION]: the act of driving back; a rebound, reverberation; in *music*, frequent repetition of the same sound. RE'PERCUS'SIVE, a. *-kŭs'siv*, having the power of driving back, driven back; causing to reverberate.

RÉPERTOIRE, n. *rā per-twär'* [F.]: a repertory—which see.

REPERTORY, n. *rĕp'ĕr-tŏr-i* [F. *répertoire*, a repertory—from mid. L. *repertorium*, an inventory, catalogue—from L. *reperire*, I find out or discover: It. *repertorio*, a repertory]: a place in which things are arranged in an orderly manner, so as to be easily found; a magazine; a treasury.

REPETEND, n. *rĕp'ē-tend* [L. *repetendus*, to be brought back: *repeto*, I fetch back—from *re*, back or again; *peto*, I seek]: in *arith.*, that part of a repeating decimal which recurs continually *ad infinitum*.

REPETITION, n. *rĕp-ē-tish'un* [F. *répétition*, repetition—from L. *repetitionem*, a repetition—from *re*, again, *peto*, I seek: It. *repetizione*]: the act of repeating; recital; rehearsal: tautology; in *Scotch law*, repayment of money received in mistake or ignorance; money paid by mistake as to law cannot be recovered, but only if paid under mistake as to fact. REPETITIONAL, a. *-al*, containing repetition. REPETITIVE, a. *rē-pĕt'i-tiv*, containing repetition; repeating.

REPINE, v. *rē pīn'* [*re*, again, and *pine* 2, which *see*]: to feel a discontent which preys on the spirits; to fret one's self; to be discontented; to murmur. REPIN'ING, imp.: ADJ. disposed to murmur or complain: N. the act of fretting and brooding over a thing. REPINED', pp. *pīnd'*. REPIN'ER, n. *-ĕr*, one who repines. REPIN'INGLY, ad. *-li*.

REPLACE, v. *rē plās'* [*re*, again, and *place*: F. *replacer*]: to put again in a former position; to put in a new place; to refund; to put another in the place of one removed; to succeed. REPLAC'ING, imp. REPLACED', pp. *-plāst'*. REPLACE'MENT, n. *-mĕnt*, exchange of places; substitution.

REPLAIT, v. *rē-plāt'* [*re*, again, and *plait*]: to plait or fold again.

REPLANT, v. *rē-plănt'* [*re*, again, and *plant*: F. *replanter*]: to plant again.

REPLEAD, v. *rē-plēd'* [*re*, again, and *plead*]: to plead again. REPLEAD'ER, n. *-ĕr*, in *law*, a second pleading, or the right to plead again.

REPLENISH, v. *rē plĕn'ish* [OF. *replenir*, to replenish, *replenissant*, replenishing: L. *re*, again; *plenus*, full]: to fill; to stock with numbers or abundance; in *OE.*, to complete; to finish, to consummate. REPLEN'ISHING, imp. REPLEN'ISHED, pp. *-isht*, abundantly supplied. REPLEN'ISHER, n. *-ĕr*, one who replenishes. REPLEN'ISHMENT, n. *-mĕnt*, act of replenishing or the state of being replenished

REPLETE, a. *rē-plēt'* [F. *replet*—from L. *replētus*, filled —from *re*, again; *plērē*, to fill: It. *repleto*]: completely filled; full; abounding. REPLETE'NESS, n. *-nĕs*, the state of being replete. REPLETION, n. *re-plē'shŭn*, superabundant fulness; plethora. REPLE'TIVE, a. *-tiv*, tending to fill or replenish. REPLE'TIVELY, ad. *-lĭ*.

REPLEVIN: see REPLEVY.

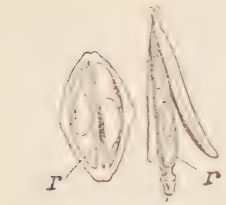
REPLEVY, v. *rē-plĕv'ĭ* [L. *re*, again; OF. *plevir*, to promise, to answer for; *plevine*, warranty (see PLEDGE)]: to take back or reclaim, as cattle or goods, upon giving security to try the rights of distraint at law; in *law*, to take back or set at liberty anything seized upon security being given. REPLEV'YING, imp. REPLEVIED, pp. *-plēv'id*. REPLEV'IABLE, a. *-ĭ-ă-bl*, that may be recovered from illegal distraint. REPLEV'IN, n. *-ĭn*, in *law*, an action to recover possession of goods or cattle wrongfully taken away. By the common law whenever goods of a person were wrongfully taken out of the possession of another, the person from whom they were taken—if he wished to have them restored and to try the legality of the seizure—might get back the goods by giving security to the sheriff of the county to prosecute an action, in which the injustice of the taking would have to be proved; the process issued to the sheriff in such an action was called a writ of replevin. In the U. S., however, the common law has been deviated from, and the action of R. is not confined to cases where goods have been wrongfully distrained, but the remedy may be applied in all cases where personal property has been unlawfully taken or detained from the rightful owner. The object of the action is to get back the specific property taken, and not to recover damages as in an action for conversion; both of these actions are concurrent remedies, and either may be adopted at the election of the plaintiff; and in some of the states a mixed action for the return and damages for the detention of the property may be brought. In most of the states the action of R. is governed by statutory regulations, substantially the same in their general features in the different states. In some of these statutes the action is termed 'action for the claim and delivery of personal property;' in others, 'an action to recover a chattel.'

REPLICA, n. *rĕp'lĭ-kâ* [It. *replica*, a repetition—from L. *re*, again; *plico*, I fold]: a copy of an original picture done by the same master.

REPLICATE, a. *rĕp'lĭ-kāt* [L. *replĭcātus*, folded or rolled back—from *re*, back; *plico*, I fold]: in *bot.*, doubled down, so that the upper part comes in contact with the lower.

REPLICATION, n. *rĕp'lĭ-kā'shŭn* [L. *replĭcātiōnem*, a folding or rolling back again (see REPLY)]: a response; an answer: in *law*, the plaintiff's answer to the defendant's plea.

REPLIED, REPLIER, etc.: see under REPLY.



Replum.

REPLUM, n. *rē′plŭm* [L. *replum*, a door-case, the leaf of a door]: in *bot.*, a longitudinal division in a pod formed by the placenta, as in *Cruciferæ;* the persistent portion of some pericarps after the valves have fallen away; a spurious dissepiment.

REPLY, v. *rē-plī′* [F. *replier*, to fold again; *répliquer*, to reply—from L. *replicārĕ*, to fold or roll back—from *re*, back; *plico*, I fold: It. *replicare*]: to make a return in words or in writing to something which has been said or written by another: to answer; to respond. N. an answer; a rejoinder; that which is said or written in answer to another. REPLY′ING, imp. REPLIED′, pp. *-plīd′*. REPLI′ER, n. *-ėr*, one who replies.

REPOLISH, v. *rē-pŏl′ish* [*re*, again, and *polish*]: to polish again.

REPONE, v. *re-pōn′* [L. *reponere*, to replace, to restore —from *re*, back or again; *ponĕrĕ*, to put or place]: in *Scotch law*, to restore to a situation formerly held. REPO′NING, imp. REPONED′, pp. *-pōnd′*.

REPORT, v. *rē-pōrt′* [L. *repertārĕ*, to bring back; to report—from *re*, back or again; *porto*, I carry: It. *riportare;* F. *rapporter*, to relate; to bear or bring back, as an answer; to give an account of; to relate; to circulate by popular rumor; to announce or make a statement of facts; to give an official statement; to follow the business of a reporter; in *mil.*, to announce or inform of one's presence; to state officially to a superior the breach or neglect of duty on the part of another. N. an account or statement circulated; that which is noised about respecting a thing; common fame; noise, as of a gun; an official statement of facts; a statement of proceedings, etc.; an account of a law case. REPORT′ING, imp.: N. the act of giving an account of anything orally or in writing; the art or profession of a reporter. REPORTED, pp. REPORT′ER, n. *-ėr*, one who writes down in shorthand the proceedings of legislatures, of courts of law, and of public meetings, etc., with a view to publication. REPORT′ABLE, a. *-ă-bl*, fit to be reported. TO BE REPORTED or TO BE REPORTED OF, to be well or ill spoken of; to be mentioned with respect or reproach. TO REPORT ONE'S SELF, to present one's self before a superior, or at headquarters, for inspection or orders. CONFIDENTIAL REPORT, a private and secret statement of the results of an inspection or inquiry to a superior authority.—SYN. of 'report, v.': to narrate; recite; tell; relate; describe; detail;—of 'report, n.': narration; detail; relation; account; description; narrative; recital; hearsay; story; rumor; fame; renown. repute.

REPORTING, British Parliamentary: public reports of speeches, debates, and proceedings in the British legislature. The voluminous work *Parliamentary History of England*, is considered in England the most valuable historical work in the language. In the reign of Queen Anne, a monthly pamphlet, the *Political State*, gave an outline of the debates in parliament. In the reign of George I., the *Historical Register*, published annually, professed to give reports of parliamentary speeches. The *Gentleman's Magazine* began a monthly publication of the debates, the number for 1735, Aug., containing a report of the debate in the house of lords on the previous Jan. 3. Cave, the publisher, continued the practice in succeeding numbers; procuring for a friend or two with himself, admission into the gallery of the house of commons, or to some concealed station in the other house, where they privately took notes, which they compared and adjusted in a neighboring tavern. An abler hand, Guthrie the historian, was employed to reduce this crude matter to form; but no publication of it was made till after the session had ended. Cave, at length growing bolder, printed in full the names of speakers. Both houses took alarm, and passed resolutions forbidding reports of debates. The publication of the debates of either house had been repeatedly declared a high breach of privilege. In 1738 Speaker Onslow called the attention of the house of commons to the breach of its standing orders by Cave and others. The result was another resolution against the publication of debates 'either while parliament is sitting or during the recess,' and a threat to proceed against offenders with the 'utmost severity.' The reports, notwithstanding, still appeared, but under the disguise of 'Debates in the Senate of Lilliput,' in the *Gentleman's Magazine;* and 'Debates in the Political Club,' in the *London Magazine*. The celebrated Dr. Johnson was employed by Cave in the composition of his parliamentary debates, and the reports 1740–43 are held to have been entirely prepared by him; sometimes with the assistance of the abovementioned Guthrie, who had a good memory, and used to bring home as much as he could recollect from the house; and sometimes, according to Boswell, with no other aid than the names of the orators and the side on which they spoke. When it was observed to Johnson that he dealt out reason and eloquence equally to both parties, he remarked: 'I took care that the whig dogs should not have the best of it.' It was not till 30 years later that the parliamentary debates descended from the magazines to the newspapers. The latter had, however, for some time resolved to report the debates (Woodfall's *Junius*, iii. 345), and they took advantage of the popular excitement concerning the Luttrell-Wilkes election for Middlesex, to try the right of the house to interdict the publication of its proceedings.

The memorable contest between parliament and the press began at the close of 1770. Some printers of London daily papers were ordered under arrest, 1771, Mar., for

printing the proceedings of the house of commons. Some surrendered, and asking pardon on their knees at the bar of the house, were discharged. One, Miller, not surrendering, was ordered into the custody of the sergeant-at-arms, whose messenger arrested Miller within the city of London, and was immediately given into custody by Miller for assault, and carried before the lord mayor, who declared the speaker's warrant illegal, discharged Miller, and committed the messenger for assault. Two other printers, Wheble and Thompson, had been carried respectively before Aldermen Wilkes and Oliver, who immediately discharged them, and bound them over to prosecute, and the speaker's messenger to answer, a charge of assault and false imprisonment. The house of commons was furious. It ordered the attendance of the lord mayor (a member of the house), and of Alderman Oliver. The aldermen of London attended the house, and pleaded their own cause, alleging that their charters exempted the citizens from any law process being served on them except by their own officers. The house committed the lord mayor and Alderman Oliver to the Tower. The city of London loudly protested, and the whole country responded to the appeal. The power of parliament to imprison ceases at the end of the current session, and on the day of prorogation, 1771, July 23, the lord mayor and Alderman Oliver marched out of the Tower in triumph; and at night the city was illuminated. A few days afterward, the speaker's messenger who had arrested Wheble was tried at Guildhall for the assault, found guilty, fined 1s., and imprisoned for two months. Next session, the house of commons tacitly acknowledged itself beaten. The printers defied the house and continued to publish their proceedings. In a short time, the house of lords also conceded the point. The victory was complete, and no attempt has since been made to prevent publication of the debates and proceedings of parliament. The resolution affirming that it is a high indignity to, and 'notorious breach of, the privileges of the house to publish the debates,' still remains unrevoked on the Journals; yet galleries have been constructed for accommodation of reporters. It is still in the power of any member, who may call the speaker's attention to the fact that 'strangers are present,' to exclude the public and the reporters from the house; and this power has been exercised during living memory; but on such occasions one or more members who have dissented from this course have taken notes of the speeches, and have avowedly sent them to the newspapers.

The old machinery of newspaper reporting was exceedingly defective till 1815. At that time the public interest in domestic affairs made the publication of parliamentary debates an object of national importance; and in a few years parliamentary reporting assumed its present full, detailed, and accurate character. Increased facilities for the discharge of their important and arduous duties were from time to time given to the reporters. In the splendid

new Palace of Westminster, in which the two houses now hold their deliberations, exclusive galleries are provided for accommodation of reporters: in the house of lords, their gallery faces the throne and the woolsack; in the house of commons, it is behind the chair. The organization of parliamentary reporters for the *Times* newspaper and other great English journals is admirably complete; and arrangements of all kinds have been brought to a perfect system for securing expedition and accuracy. A long speech may be said to extend from the mouth of the speaker to Printing House Square. A part will be wet with ink on the reporters' table; one section will be travelling over the Thames Embankment in swift relays of cabs; a portion, becoming larger every few minutes, will be in the hands of the compositors, and a proof-sheet ready printed, of the earlier passages, will be on the desk of the editor.

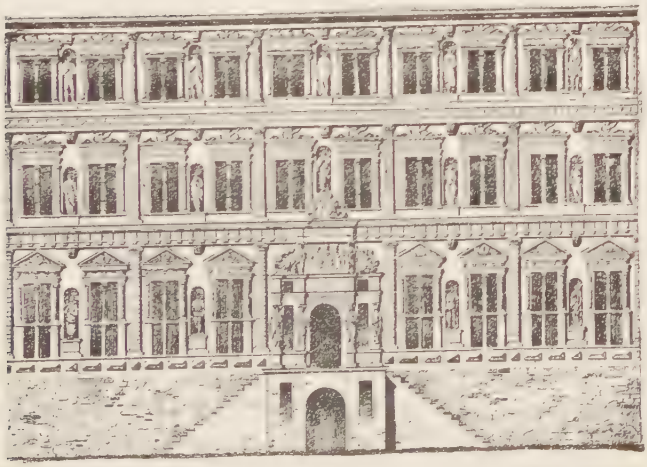
A few years ago the object desired by newspaper proprietors was not a literal report, but what may be called the spirit of a speech—a faithful abridgment of the sentiment, matter, and style of the speaker. Parliamentary reports subsequently became more diffuse, the debates of a single evening not unfrequently occupying between 20 and 30 columns of small type. This, however, has not been maintained; and though much might be said against reporting at great length of important speeches, there can be nothing said in favor of such excessive condensation of all speeches as prevails in most of the London newspapers—the *Times* and the *Standard* being exceptions. The only publication since the *Mirror of Parliament* which professes to give all the speeches fully and accurately, is *Hansard's Parliamentary Debates* (see HANSARD).

Publicity is now recognized as one of the most important instruments of parliamentary government. Long before a measure can be adopted by the legislature, it has been approved or condemned by the public voice; and, living and acting in public, parliament under a free representation has become as sensitive to public opinion as a barometer to atmospheric pressure. See May's *Constitutional History of England;* Knight Hunt's *Fourth Estate;* Andrews's *History of British Journalism;* papers in *Chambers's Journal* in 1834; Grant's *The Newspaper Press* (1871); also article NEWSPAPER.—See WILKES, JOHN.

In European continental countries under constitutional government, official shorthand writers are usually appointed by the govt. to report the debates; and these reports may, under certain restrictions, be given to the press.—See REPORTING, CONGRESSIONAL AND OTHER LEGISLATIVE.

REPORTING, CONGRESSIONAL AND OTHER LEGISLATIVE: act of taking down for preservation or publication the speeches and proceedings in legislative bodies. In the United States it is done by two kinds of reporters, official and newspaper. The duties of an official reporter are wholly distinct from those of the clerk or sec. of the body who keeps the official record of the proceedings and

Strozzi Palace, Florence, erected 1489.



Vol. 25. Heidelberg Castle, erected 1556–1559.

the movement of bills and resolutions. Formerly rapid long-hand writers were employed to report legislative speeches and debates; but they are now generally superseded by stenographers. All official reporters in the U. S congress are stenographers. In the senate there are a chief and four assistants; in the house a chief and five assistants. In both branches nearly all the clerks of committees are stenographers. The same customs prevail in the principal state legislatures.—Each house of congress has a special gallery for the exclusive use of newspaper reporters, under the control of the senate committee on rules and of a standing committee of the newspaper correspondents on duty at Washington. These reporters do not pretend to take down speeches and debates *verbatim*, but rather apply themselves to running notes of a speech or debate and to composing word pictures of scenes in the halls below during important or exciting movements. Strict rules govern the issue of tickets for the privilege of the press galleries, and no reporter holding one can be personally interested in any legislation before congress or in any claim before its committees. In 1895 more than 150 reporters, representing newspapers in every part of the country, held tickets to the press galleries.

REPOSE, v. *ré-pōz* [F. *repos*, rest; *reposer*, to rest, to repose—from L. *repositus*, placed back again—from *re*, back or again; *pono*, I place: It. *riposare:* Sp. *reposar*]: to lay or be at rest; to rest mentally; to place or rest in, as confidence; to sleep; to recline; to rely, with *in* or *on:* N. state of sleep; rest; quiet; rest of mind; in *paint.*, certain parts in the composition of a picture which seem to tranquillize its aspect. REPO'SING, imp. REPOSED', pp. *-pōzd'*. REPO'SAL, n. *-zăl*, the act of reposing or resting. REPO'SEDLY, ad. *-zed-li*. REPO'SEDNESS, n. *-zed nes*, state of being at rest. REPO'SER, n. *-zer*, one who reposes. REPOS'IT, v. *-poz'it*, to lay up; to lodge, as for safety or preservation. REPOS'ITING, imp. REPOS'ITED, pp. REPOSITION, n. *rē'pō-zish'un*, the act of replacing; the act of laying up in safety. REPOSITORY, n. *ré-pŏz'i-tēr i* [L. *repositōrium*, a cupboard]: a place where things are deposited for safety or preservation; a place where articles are kept for sale.—SYN. of 'repose, v.': to rest; recline; sleep; lodge; abide; settle; deposit; reposit; couch;—of 'repose, n.': rest; ease; quiet; quietness; peace; tranquillity; recumbency; reclination.

REPOSSESS, v. *rē'pŏz-zĕs'* [*re*, again, and *possess*]: to possess again. RE'POSSES'SION, n. the act of possessing again.

REPOUR, v. *rē-pōr'* [*re*, again, and *pour*]: to pour again.

REPOUSSÉ, n. *rē-pōs'ā* [F.—from *repousser*, to thrust back; *re*, again, and *pousser;* L. *pulsare*, to push]: ornamented metal-work formed in relief; and the method of producing it. The ornamentation resembles embossing; but the effect is produced by hammering up the metal, which is generally thin, from the back; and when a rude resemblance of the figure to be produced is thus formed, it is worked up by pressing and chasing the front surface. The finest specimens of this art are of the *cinque-cento* or 16th c. period, by Benvenuto Cellini. Cellini carried the art to France, where it has of late been much developed. Much common R. work is done in various countries in the soft white metals, such as pewter and Britannia metal; and as these are easily worked, and can afterward be electroplated, so as to hide the quality of the material, they are in considerable demand. After they are hammered up from the inside, they are filled with liquid pitch, and set by until it becomes solid. Then they are modelled and chased on the surface, the pitch forming a support, which prevents the tools from pressing down more than is required. The pitch is afterward melted and drained out, and a subsequent boiling in an alkaline lye completely cleans the work. Tea and coffee pots are among the chief articles made in this manner.

REPPLIER, Agnes: essayist; b. Philadelphia. She is of French extraction, and a member of the Rom. Cath. ch. She is largely self educated, not having learned to read until nine years of age, but having been an eager listener to the best reading. Her method still is to read and to write what interests her. She began writing at an early age, and showed a combined force of thought and charm of expression which soon secured place in the *Atlantic Monthly* and other leading periodicals. She visited England 1894, and was received with welcome in literary circles. Her published works include *Books and Men*, 1888; *Points of View*, 1891; *Essays in Miniature*, 1892; *Essays in Idleness*, 1893; *In the Dozy Hours*, 1894; and *Varia* (Essays) 1897. Miss R. has also edited a *Volume of Famous Verse* in *Riverside Library for Young People*.

REPREHEND, v. *rĕp'rē-hĕnd'* [L. *reprehen'dĕrĕ*, to check, to censure; *reprehen'sus*, checked, restrained—from *re*, again; *prehendĕrĕ*, to lay hold of: It. *riprendere;* F. *reprendre*]: to administer reproof or censure to; to chide; to rebuke; to censure. Rep'rehend'ing, imp. Rep'rehend'ed, pp. Rep'rehend'er, n. *-ẽr*, one who reprehends. Rep'rehen'sible, a. *-rē-hĕn'sĭ-bl* [F.—L.]: deserving reproof or censure; blamable; culpable. Rep'rehen'sibly, ad. *-blĭ*. Rep'rehen'sibleness, n. *-bl-nĕs*, the quality of being reprehensible; culpableness. Rep'rehen'sion, n. *-hĕn'shŭn* [F.—L.]: reproof; censure. Rep'rehen'sive, a. *-sĭv*, or Rep'rehen'sory, a. *-sẽr-ĭ*, containing reproof or censure.—Syn. of 'reprehension': reproof; blame; censure; admonition; caution; reprimand; warning.

REPRESENT, v. *repre-zent* [F. *représenter*—from L. *repræsentāre*, to represent—from *re*, again; *præsentāre*, to place before—from *præsens* or *præsentem*, present: It. *rappresentare*]: to show or exhibit by resemblance; to describe; to show by words and actions; to personate; to act the character of another, as in a play; to appear in an assembly for others; to act as a substitute for; to show by arguments or a statement of facts. REPRESENTING, imp. REPRESENTED, pp. REPRESENTER, n. *-er*, one who represents. REPRESENTABLE, a. *-a-bl*, that may be represented. REPRESENTMENT, n. *-ment*, image; an idea proposed as exhibiting the likeness of something. REPRESENTATION, n. *-ā-shun* [F.—L.]: the act of describing or showing; a respectful declaration; that which exhibits by resemblance, as a picture or a statue; a plan, a map; a model; the act of representing others, as by deputation; a collective body of representatives (see REPRESENTATION, in Politics); performance, as of a play on the stage. REPRESENTATIVE, n. *-ā-tiv*, one who exhibits the likeness of another; an agent; a deputy; a substitute; one who represents another or others; in *nat. hist.*, that which represents the full character of the type of a group: ADJ. bearing the character or power of another; conducted by the agency of delegates chosen by the people. REPRESENTATIVELY, ad. *-li*. REPRESENTATIVENESS, n. *-nes*, the state or quality of being representative.—SYN. of 'representation': resemblance, exhibition; likeness; description; show; delineation; portraiture; sight; spectacle.

REPRESENTATION, in Politics: function of the delegate of a constituency in a legislative or other public assembly. The principle of R., even where not directly recognized, must be presumed to have existed to some extent in all governments not purely democratic, so far as the sense of the whole nation was considered to be spoken by a part, and the decisions of a part to be binding on the whole. The constitution of ecclesiastical councils, in which an express or implied R. is necessarily involved, doubtless conduced to the application of a similar principle to national assemblies; but it is in the exigencies of feudalism that we trace the beginnings of an avowed and regulated system of political R. The feudal superior who had to levy aid from his vassals, summoned a limited number of them to attend him, and confer regarding the required aid. The earliest complete system of representative institutions is found in the parliament of the Sicilies under the Swabian kings; but Britain is the only country in which a representative feudal assembly ripened into a legislative. As early as the reign of Henry III., we find the knights of the shire elected by the 'men of the country' probably the king's military tenants, to consider, in the stead of each and all of them, what aid would be granted to the king for a proposed expedition into Gascony. Representatives of the burgesses were soon afterward summoned, and were permanently ingrafted on parliament by Edward I. In Scotland, representative burgesses formed a part of the national assembly from the time of

Robert Bruce's famous parliament at Cambuskenneth 1326; but till a comparatively late period, all the barons or freeholders of the country formed part of the king's council and were entitled to attend in person. James I., on his return from England, attempted to introduce a system of R. among them, but it became practically inoperative; and it was not till 1587 that the representatives of the small barons came to form part of the parliament. The progress of society has led to great changes in the constitution of the British elective body, the most sweeping being those introduced by the Reform acts: see PARLIAMENT: REFORM, PARLIAMENTARY.

An important question naturally arises connected with the subject of R.: Is the delegate the mere mouthpiece of his constituents, who must give effect to all their opinions and interests, or is it his duty to exercise his trust in the first instance for the general welfare of the nation? The former idea of R. was doubtless the earlier one; but it cannot be easily vindicated on any proper theory of government; and it is now the generally recognized doctrine among English statesmen, that a member of the house of commons is bound to the entire nation by ties higher than those which bind him to his constituents; and that he ought to support such measures as he judges most beneficial to the country, even at the risk of prejudicing the immediate local interests of the body which sends him. It is therefore not very easy to reconcile with sound principles the usage which obtains so largely of demanding pledges from candidates for R. as to how they are to vote on every public question that is likely to come before them. Yet there is practically a difficulty in preventing a system of R. from becoming one of mere delegation, so long as the constitution gives to the electors the power of making their vote depend on any conditions which they may think fit to attach to it.

Most speculative politicians of the present day consider a representative government of some sort as the best ideal type of government; but all repudiate the idea of an inborn right in all citizens to participate, and still more to participate equally, in the right of choosing the governing body. Any very extensive suffrage tends to the predominance of mere numbers over intelligence, while a very limited suffrage has been objected to as precluding the benefits which the community at large are presumed to draw from participation in public functions. Several intelligent political writers, while advocating a widely extended suffrage, have proposed a graduation of that suffrage by giving to each individual a number of votes corresponding, as far as practicable, to his intelligence, property, or social position. This is set forth as the ideal of representative government; but the chief question is: By what test can the best approximate estimate of social value be arrived at? Two different schemes for this purpose have been proposed by John Stuart Mill and Prof. Lorimer respectively—the former founded mainly on intelligence as indicated by instruction, and the latter on wealth and social position. The

attention of political writers has lately been directed also to the question of the R. of minorities in local communities, which at present are not allowed to contribute an element in representative assemblies. The most feasible scheme for minority R. is perhaps that of Hare, which had the approval of Mill, by which those who do not like the local candidates, are to be allowed to fill up voting papers by a selection from the names of any persons on the list of candidates with whose general political principles they sympathize. This system, with its other advantages, would, it is supposed, bring into legislative bodies numerous men of able and independent thought, who, by the present system, refrain from offering themselves, as having no chance of election by the majority of any existing constituency. See J. S. Mill, *Representative Government* (1861); Lorimer, *Political Progress not necessarily Democratic* (1857); Hare, *The Election of Representatives* (1860); Walpole, *The Electorate and the Legislature* (1882); Traill, *Central Government*.

In the United States provision has been made by law in several states for the R. of minority bodies. Thus the N. Y. statute prescribing the mode of electing members of the constitutional convention of 1867 provided for the election by the people of 32 members at large, but an elector was permitted to cast his vote for only 16; thus each of the 2 political parties could elect an equal number of the members. In Penn., the constitutional convention act of 1872 provided for a proportional R. of the 2 parties in the election of members of the convention: but in Penn. all the members—those at large and those for the 33 districts—were to be chosen according to this method, viz.: a voter might cast ballots for 14 of the 28 members at large; and for 2 out of 3, or 4 out of 6, of the members from his district. This scheme of 'limited voting' has often been put in practice in other states. A different mode of attaining the same end is the 'free' or 'cumulative' vote. This scheme enables even a small minority of the body politic to obtain R. By it every elector is entitled to a number of votes equal to the number of representatives to be chosen from his district: but he may give them all to one candidate. The method of cumulative voting was proposed for adoption in the Brit. parliament 1867, but was rejected: it has since been put in practice in Britain in the election of local representative bodies. It is embodied in the Ill. constitution of 1870: Art. IV. § 7 prescribes the method of cumulative voting for election of members of the state house of representatives. By the laws of many of the states the same method is required in election of directors and managers of incorporated companies. See BALLOT: SUFFRAGE: GOVERNMENT (and references under it).

In the United States the theory is that the senate represents the several *states* as equal individual political entities, while in the lower house the representatives of the *people* appear: thus in the senate all the states, large and small, have an equal representation—each state having 2 senators and no more. In the house of representatives, the people of each state have a R. proportioned in number to the

population, except that each state, however small, is entitled to R. by one member. The territories of the United States have no R. in the federal senate: to the house of representatives they are entitled to send each one 'delegate,' who, however, has no vote. In most of the state legislatures, R. in both of the houses is generally based on population, regard being had, however, to geographical subdivisions, as counties, townships, wards, etc. In some states (e.g., Conn.) the town is in part the basis.—See CONGRESS, U. S.

REPRESS, v. *rē-prĕs'* [L. *repressus*, checked, restrained —from *re*, back; *pressus*, pressed, squeezed; *premĕrĕ*, to press]: to put or keep down; to crush; to restrain; to subdue. REPRESS'ING, imp. REPRESSED', pp. *-prĕst'*. REPRESS'ER, n. *-ẽr*, one who represses. REPRESS'IBLE, a. *-i-bl*, that may be repressed. REPRESS'IBLY, ad. *-blĭ*. REPRES'SION, n. *-prĕsh'ŭn* [F.—L.]: the act of subduing; check; restraint. REPRESS'IVE, a. *-prĕs'ĭv*, tending or able to repress. REPRESS'IVELY, ad. *-lĭ*.—SYN. of 'repress': to subdue; overpower; crush; smother; suppress; curb; check; restrain; quell.

REPRIEVE, v. *rē-prēv'* [OF. *reprover*—from L. *reprobārĕ*, to disallow, to reject (see REPROBATE)]: to suspend or delay the execution of a criminal; to grant a respite to; to relieve from any suffering for a time: N. suspension or delay of punishment for a crime; applied chiefly in connection with capital crimes. The U. S. constitution gives the pres. power to grant reprieves. There are several grounds on which the judge or a court may grant R. One is, where the judge is not satisfied with the verdict, or is doubtful of the validity of the indictment; in which case he reprieves the sentence to give time for some appeal. Moreover, a ground of R. acted on as a matter of course, is when the prisoner is a woman pregnant in the sense of being 'quick with child,' and pleads that fact; in which case execution of the sentence is delayed until after her delivery. This was the law of ancient Rome; and nothing connected with the memory of Queen Mary in her persecution of the Protestants is more detestable than the burning in her reign of a pregnant woman in Guernsey, when the child, which was born at the stake, was cast into the fire as a young heretic. Another cause of R. is the insanity of the prisoner, whether the insanity supervened after the crime or not. REPRIEV'ING, imp. REPRIEVED', pp. *-prēvd'*.

REPRIMAND, v. *rĕp'rĭ-mănd'* [F. *réprimander*, to reprimand—from L. *reprimen'dus*, to be curbed or restrained —from *re*, back; *premo*, I press]: to administer a severe reproof or rebuke to for a fault, either in private or in public; to chide or reprove; to censure; to admonish: N. severe reproof or censure for a fault. REP'RIMAND'ING, imp. REP'RIMAND'ED, pp. —SYN. of 'reprimand, v.': to rebuke; censure; blame; reprove; reprehend; chide; reproach; upbraid; animadvert.

REPRINT, v. *rē-prĭnt'* [*re*, again, and *print*]: to print a second or new edition: N. *rē'prĭnt*, a second or new edition of a book. REPRINT'ING, imp. REPRINT'ED, pp.

REPRISAL, n. *rē-prī'zăl* [F. *représaille*, retaliation—from It. *ripresaglia*; L. *reprehensus*, held back, seized (see REPREHEND)—retaking, from an enemy, goods which he has seized, or captured from him of other goods, as equivalent for the damage that he has wrought. LETTERS OF REPRISALS, same as Letters of Marque (q.v.).

REPRISE, n. *rē-prīz'* [F. *reprise*, a retaking; L. *reprensus* or *reprehensus*, taken or held back (see REPREHEND)]: a ship retaken from an enemy or pirate; if recaptured within 24 hours of the hostile seizure, she must be wholly restored to her owners; if later, she is the lawful prize of her recaptors: in *arch.*, the return of moldings in an internal angle: in *OE.*, the act of taking something by way of retaliation: V. in *OE.*, to take again; to recompense. REPRISING, imp. REPRISED, pp. *-prīzd'*. REPRISES, n. plu. deductions and payments made annually out of lands, as rent.

REPROACH, v. *rē-prōch'* [F. *reprocher;* prov. F. *repropchar;* Sp. *reprochar*, to reproach, to blame—from a supposed mid. L. *repropiārē*, to lay before one's eyes, to blame—from L. *prope*, near: also mid. L. *reprochiārē*, to charge with crime]: to pass censure upon in contemptuous terms; to upbraid; to charge with a fault in severe language: N. censure mingled with contemptuous language; severe reproof; infamy; object of contempt or scorn, that which is the cause of shame. REPROACH'ING, imp. REPROACHED', pp. *-prōcht'*. REPROACH'ER, n. *-ĕr*, one who reproaches. REPROACH'ABLE, a. *-ă bl*, capable of being reproached. REPROACH'ABLY, ad. *-blī*. REPROACH'ABLENESS, n. *-bl nĕs*, the state of being reproachable. REPROACH'FUL, a. *-fŭl*, containing or expressing reproach; bringing or casting reproach; upbraiding; scurrilous; base. REPROACH'FULLY, ad. *-lī*, in a reproachful manner; scurrilously; ignominiously. REPROACH'FULNESS, n. *-nĕs*, the quality of being reproachful. REPROACH'LESS, a. *-lĕs*, without reproach.—SYN. of 'reproach, v.': to rebuke; censure; blame; upbraid; revile; vilify, condemn;—of 'reproach, n.': discredit; scandal; dishonor; contempt; insult; scorn; disgrace; infamy; shame; disrepute; opprobrium; invective; abuse; reviling; scurrility, insolence; contumely; sarcasm.

REPROBATE, a. *rep'rō-bāt* [L. *reprobatus*, censured, reproved; *reprobārē*, to disapprove—from *re*, again; *probārē*, to test]: wholly given up to sin; lost to virtue or grace; depraved; abandoned; rejected. V. to disapprove with marks of extreme dislike; to give up to destruction without hope of pardon. N. a person given up to wickedness; one lost to virtue and religion. REPROBATING, imp. REPROBATED, pp.: ADJ. rejected; abandoned. REPROBATENESS, n. *-nĕs*, the state of being reprobate. REPROBA'TION, n. *-bā'shŭn* [F.—L.]: the act of disallowing with abhorrence; in *theol.*, state of being consigned or abandoned to destruction without hope of pardon—the opposite of *election*. REPROBATIONER, n. *-ĕr*, one who holds that part of the human race were created for reprobation.—SYN. of 'reprobate, a.': abandoned; profligate; vile; base; vitiated; depraved; castaway; corrupt; wicked.

REPRODUCE, v. *rē′prō-dūs′* [*re*, again, and *produce*: F. *reproduire*: Sp. *reproducir*]: to form anew in whole or in part what has been cut off or lost; to generate, as offspring. RE′PRODU′CING, imp. RE′PRODUCED′, pp. *-dūst′*. RE′PRODU′CER, n. *-sėr*, one who or that which reproduces. RE′PRODUC′TIVE, a. *-dŭk′tĭv*, pert. to or used in reproduction; generative. RE′PRODUC′TION, n. *-shŭn* [F.—L.]: the act or process of renewing that which has been lost or destroyed; generation; that which is reproduced.

REPRODUC′TION IN ANIMALS: propagation of organized beings in the animal kingdom. R. is by three different processes. The first of the three modes of multiplication of individuals is the division of one organism into two; each of these, again, dividing into two others, and so on: this is termed *R. by fission*. The second mode of R. is the formation of a bud at some part of the body of the animal: this bud gradually approximates in form to that of the parent from which it springs; its pedicle or stem gradually disappears; and the liberated bud ultimately assumes a perfect form, resembling in all respects the parent from which it sprang: *R. by gemmation*. The third mode is far the most complicated: in it the new organism results from a series of change soccurring in an impregnated egg or *ovum*. For this process, distinct sexual organs, both male and female, are required; which, however, may be associated in the same individual, though in all the higher animals they occur in distinct individuals—a female organ for the production of cells termed 'germs,' and a male organ for the production of certain cell stermed 'spermatozoa.' It is from the union (either within or without the body) and the mutual action of these cells—the germ and the spermatozoon—that the

Fig. 1.—Longitudinal Fission of Vorticella.

impregnated ovum results. The new resulting body is altogether different from either of the cells which took part in its production. This is the ordinary form of R. in all the higher animals, and may be termed *true generation*, in contradistinction to the previous forms of *reproduction by multiplication*. The terms *Digenesis* and *Heterogenesis* have been applied by recent physiological writers to designate the form of R. in which the contact of germs and spermatozoa gives rise to fecundation; while the germs *Monogenesis* and *Homogenesis* have been similarly applied to the cases in which non-sexual R. takes place by fission or gemmation.

Fissiparous multiplication is illustrated by reference to the Infusoria. It may be either longitudinal, as usual in *Vorticella*: or transverse, as in *Stentor;* or indifferently

longitudinal or transverse, as in *Chilodon*, *Paramecium*, etc. The joints of tape-worms multiply in this manner, and when sufficiently developed become free. Among some of the Annelids or true worms, also, R. of this kind in somewhat modified form is observed. This was noticed first in a *Nais* by the Danish naturalist Müller, by whom it was regarded as rare and accidental. Researches of De Quatrefages and Milne-Edwards have shown that the process is far more significant than Müller supposed. In the genus *Syllis*, De Quatrefages noticed the following appearances: When one of these worms is about to reproduce itself by fission, a number of rings become developed at its posterior extremity, and there is a notch or groove between the first of these rings and the part in front of it. The first ring soon becomes organized into a head provided with eyes and antennæ. The two annelids, parent and offspring, continue, however, to be united by the skin and intestine in such a manner that the latter animal lives solely on

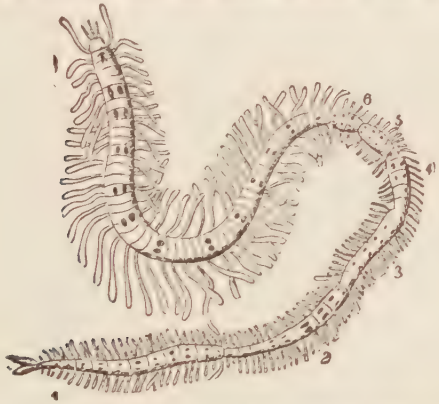


Fig. 2.—*Myriana*, with six new individuals formed on it.

the food swallowed by the former. During this period, each possesses independent life, for a struggle may often be observed between the two, each wishing to go its own way. After a certain time, the body of the offspring becomes distended with ova in some cases, and with spermatozoa in others, while neither of these structures is seen in the body of the primary animal. Complete division is at length effected, and the offspring is free. In a few days, however, their bodies burst, from the distention caused by their contents. Ova and spermatozoa are thus diffused through the water, and fecundation thus takes place. In the genus *Myrianida* (*Autolytus*, according to Grube's classification), Milne-Edwards has seen no less than six new individuals (instead of a single one, as in *Syllis*) formed in gradual succession, one before the other, between the two terminal seg-

ments of the original body. Each of these new individuals, as it arrived at maturity, and acquired the external form (in reduced dimensions) of the parents, was found to be possessed of reproductive organs, of which the original animal was totally devoid. The youngest and smallest individual is the most remote from the tail.

In these instances, multiplication by division occurs as a *natural* process, but there are many cases in which *artificial* division gives rise to multiplication. Bonnet having found that a certain kind of small worm, when cut in two, reproduced a tail at the cut extremity of the cephalic half, and formed a head upon the caudal half, increased the number of sections, and finally succeeded in dividing one worm into 26 parts, almost all of which acquired a head and tail, and thus became distinct individuals. Corresponding results may be obtained by dividing a planaria or actinia into many segments.

Reproduction by gemmation is a phenomenon very frequent in the lower departments of the animal kingdom. In the lowest of the animal sub-kingdoms, the PROTOZOA it occurs in the *Rhizopoda*—viz., in the *Foraminifera* in the *Spongiæ*, being probably the most common form of R. in sponges; and in the *Infusoria*, e.g., in *Vorticella*. In the CŒLENTERATA, it is of almost general occurrence in the classes *Hydrozoa* and *Actinozoa*; and in the MOLLUSCOIDS it occurs in *Polyzoa* and in *Tunicata*. In the accompanying figure (fig. 3), the process is shown as it occurs in the *Hydra fusca*, a fresh-water hydra (type of the *Hydrozoa*). If some hydras are kept for a few days in a glass of their native water, knot-like excrescences will be seen on their bodies. These are the buds or *gemmæ*, which rapidly enlarge, and each by degrees assumes the appearance of a young hydra, tentacles appearing about the mouth, just as in the original animal. For some time, a portion of the food (minute infusoria, entomostraca, etc.), caught and digested by the parent, passes into the body of the offspring; but when the tentacles are sufficiently developed, the young polyp catches food for itself; and when it is sufficiently matured to commence an independent existence, the connecting pedicle gives way, and the young animal is free and independent, its posterior aperture of communication soon closing.

Fig. 3.—*Hydra fusca*, with a young bud at *b*, and more advanced bud at *c*.

It must be distinctly understood that the fact of an organism reproducing itself by fission or gemmation does not by any means exclude the possibility that it may be reproduced also by fecundated ova. That this is the case is indeed shown in the instance of the

worm *Myriana*. The Hydra, too, increases by gemmation, and it may be cut in pieces, each of which becomes a perfect animal. Other corroborative cases might be given.

In *sexual generation* two special organs are required—a female organ for producing the germ-cell or ovum, and a male organ for producing the sperm-cell or spermatozoon; and each form of generative apparatus consists of two parts, of which one is a formative organ—in the female termed an *ovarium*, or ovary, and in the male a *testis*—in which the reproductive cells are formed, and which is essential; and an efferent duct, by which the products of secretion are carried off. The male and female organs may exist in separate individuals, or they may co-exist in the same individual, giving rise to the condition known as *Hermaphroditism* (q.v.). The former condition is termed *bisexual* or *dioecious*, and the latter *unisexual* or *monoecious*. For a general description of the changes which take place in the impregnated egg, see DEVELOPMENT OF THE EMBRYO.

The following briefly outlines the mode or modes of R. in the different classes of animals, beginning with the lowest.

In the sub-kingdom PROTOZOA, R. is usually by fission, occasionally by gemmation; but no satisfactory instances of true sexual propagation by means of ova and spermatozoa are known, those cases described in certain Infusoria not having been confirmed by subsequent observers. It is worthy of notice that in the Infusoria, propagation is effected in no less than three different ways—viz., by the two processes already described, and by a process known as 'encystation. See INFUSORIA.

In the sub-kingdom CŒLENTERATA, it is found that both the Hydrozoa and the Anthozoa multiply by gemmation, by a true reproductive process, and in a few genera by fission.

In the ECHINODERMATA fission has been observed in one class, the Holothuroidea, which, moreover, have distinct sexual organs combined in the same individual. In the other classes—the Echinoidea, Asteroidea, and Crinoidea—the sexes are separate, and generation takes place only by the union of germs, or ova and spermatozoa. In the ANNELIDA, true generation takes place, though, as above shown, multiplication is sometimes by fission. In the lower *Mollusca* or *Molluscoids*, multiplication is by gemmation and by true generation; while in the higher *Mollusca*, multiplication takes place only by true generation.

In the ARTICULATA—Insects, Crustaceans, etc.—distinct generative organs are always present; and, except in one class of Crustaceans—the Cirrhopoda—the sexes are distinct.

In the VERTEBRATA is found the highest and most complex development of the generative function. In them, with a doubtful exception in the case of one or two genera of fishes, the sexes are always distinct.

The *osseous* and *cartilaginous* fishes present important

differences in their reproductive organs and modes of R. In the osseous fishes, the essential female organ—the ovary, or roe—consists of a large membranous bag, usually in two lobes, sometimes single. When distended with ova, this organ fills the greater part of the abdominal cavity, and its lining membrane is arranged in folds, wherein the ova are formed and retained until ripe for expulsion. They then escape into the ovarian cavity, and are expelled in almost incredible numbers through a special opening immediately behind the anus and in front of the urinary canal. As a general rule, the ova of fishes are impregnated after their expulsion; and in order that the impregnation of a sufficient number of eggs may be secured, the male secretion of fishes—the fluid containing the spermatozoa—is very abundant; the male secreting gland, which in fishes is termed 'the milt' or 'soft roe,' being equal in bulk to the ovary of the female. In a few instances, however, the young are hatched in the ovary, and grow to a considerable size before they are born, and in these cases—e.g., in the viviparous blenny—impregnation must take place internally. In the cartilaginous fishes—as the sharks and rays—the generative organs are of higher type. The eggs are here always impregnated within the body of the female, the male having special organs by which true sexual congress is effected, and the ovaries form two large racemous bunches on either side of the spine. The eggs are large in size, and comparatively small in number; and as each egg escapes from the ovary, it is seized by a true oviduct, which furnishes it with additional protective coverings. About the middle of this tube 'there is a thick glandular mass, destined to secrete a horny shell, in which the yolk and white of the egg become incased. The egg, when completed, has somewhat the shape of a pillow-case, with the four corners lengthened out into long tendril-like cords, whereby the egg is entangled among the sea-weed at the bottom of the ocean. A brittle egg-shell would soon be destroyed by the beating of the waves; hence the necessity for the corneous nature of the envelope; and yet how is the feeble embryo to escape from such a tough and leather-like cradle? This likewise has been provided for. The egg remains permanently open at one extremity; the slightest pressure from within, therefore, separates the valvular lips of the opening, and no sooner has the little shark thus extricated itself from its confine-

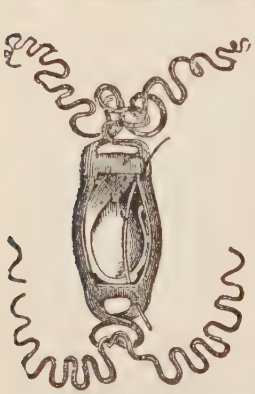


Fig. 4.—The Egg of Cartilaginous Fish, opened so as to show the young animal.

ment, than the two sides close so accurately, that the fissure is imperceptible.'

In the *Amphibia* or *Batrachia*, the sexes are more closely associated than in the osseous fishes, the ova being generally impregnated as they escape from the oviduct. The mode of R. of some amphibians is remarkable and anomalous. See PIPA.

In the true *Reptiles*, the male sexual organs become more perfect, adaptations being supplied to facilitate the impregnation of the female.

In *Birds*, the generative organs present close analogy to those of the higher reptiles. There is only a single ovary (the left) that has a bunch-like or racemous appearance; the right, with its oviduct, being always atrophied or rudimentary—a remarkable violation of symmetry, resembling that which occurs in the lungs of serpents. As prolonged utero-gestation would be incompatible with flight, incubation here attains its fullest development.

In *Mammals*, a new organ for the first time appears, from which that important class derives its name. In most of them (see MAMMALIA: PLACENTA), a temporary organ also, the Placenta, is formed, by which the fetus is nourished during uterine existence.

Huxley's *Comp. Anat. of Invertebrated Animals*, p. 27; and Balfour's *Comparative Embryology*.

REPRODUCTION IN PLANTS: propagation of organisms in the vegetable kingdom. See PLANT: VEGETABLE PHYSIOLOGY: FECUNDATION. Reproduction, so far as known, is by fission and more rarely internal self-division in the Protophytes, much as in Protozoa: budding in these low organisms is a modification of fission. Above these come the Zygospores [Gr. *zugos*, yoke], in which two sexual cells, mostly without observable difference, unite to produce a thick-walled 'resting spore' (zygospore), which continues through drought or winter. Of this division is the class named from its zoospores, or locomotive sexual cells, including the curious 'water-net,' common in ponds; the *Conjugatæ*, in which there is distinct conjugation of the entire mature plant, as in desmids and diatoms, or a commingling of the contents of conjugated cells on two filaments, as in *Spirogyra* (the pond-threads with spiral chlorophyl, order *Zygnemaceæ* and the Mucor type of molds, which also produce asexually in terminal cells (*conidia*). The Oospores, next, develop a large cell, *oogonium*, containing *oospheres*, which are fertilized by either the protoplasm or motil spermatozoids issuing from another special smaller cell, *antheridium*, and produce a resting oospore: the classes differ greatly in size and structure, including the small globular colony Volvox; the filamentous *Œdogoniaceæ*, forming green fringes on sticks in water and developing intercalary sexual cells; the similar but tubular Cœloblasts, like Vaucheria, with outgrowing sexual cells; the similar but colorless parasitic *Saprolegniaceæ;* the Peronospore molds or mildews, germinating in the cells of higher

plants, such as grape and potato vines; and the Fucaceous sea-weeds, sometimes gigantic. The Carpospores form various antherids, and a sporocarp, containing one or more spores, and with a more or less complex envelope (fruit-like, hence the name, from Gr. *karpos*, fruit), and include the class *Coleochæte*, small fresh-water masses of radiating filaments; the class *Florideæ*, red and violet sea-weeds, the spermatozoids of which float about until they come in contact with *carpogonia;* the class *Ascomycetes* [Gr. *askos*, sac], including various molds, the edible morel, black-knot, lichens, rusts and smuts; the *Basidiomycetes*, fungi; and the *Characeæ*, stoneworts, certain aquatic plants with stem and leaves—a high advance in form, with the same essential style of reproduction as rust and smut. Next above are the Bryophytes, comprising liverworts and mosses, with alternations of sexual and asexual generations, for the details of which see HEPATICÆ: MOSSES. Following these are the Pteridophytes, with similar alternations, but with much higher development of tissues: see EQUISETACEÆ: FERNS. In the highest branch, *Phanerogamia* (see PHANEROGAMIC,) flowering plants, the pollen-grain produced by the stamen, meeting the stigma of the pistil, sends down a tubular prolongation of itself to the embryonic vesicle, and a seed results, which differs from a spore in the development within it of an embryo plant. For details, see VEGETABLE PHYSIOLOGY.

Many flowering plants are fertilized by their own pollen; in most cases the wind is the agent, and the plants and flowers are not lacking in beauty (see Justice Edward Fry, *Contemporary Review*, 1879–80, on *Utility to Flowers*, etc.). In plants that have two kinds of flowers, one kind showy, the other hidden (*Cleistogenous*, q.v.), the latter are most prolific. Still, many plants are dependent on insects for cross-fertilization, which has been proved by experiment with some plants to be highly advantageous in producing vigorous offspring; and, in not a few instances, the position of stamen and pistil, or the former not coming to maturity, or else not at the same time with the latter, renders the plant dependent on insects for any fertilization at all. Sprengel, in the end of the 18th c., observed some of these facts, and they were studied by Charles Darwin (q.v.), and set forth in several of his works. While he found no adaptation to insects in some orchids, for example, in others he traced the most elaborate contrivances for this agency. Thus in one species, *Catasetum saccatum*, when an insect lights on the lip of the male flower, and touches an irritable horn of the hood, the irritability is at once conveyed to the hidden curved stamen, which springs out, and its pollen strikes the head of the insect. In many common plants of Europe and America, arrangements as certain if not as curious are found for the same purpose. As to beauty, Darwin claimed only that flowers have become 'beautiful, or rather conspicuous, in con-

trast with the greenness of the leaves,' to attract insects. This is not the same teaching as that of others, e.g. Lubbock, that the shape, colors, honey, and scent of flowers, all are due to the selection exercised by insects. This was well answered by the late Dr. Asa Gray, himself an evolutionist, in the *Contemporary Review* (1882); see summary in H. W. Parker's *Spirit of Beauty*, pp. 63-64. Dr. Gray made a distinction between insect-produced and insect-educed beauty. Darwin, with his characteristic candor, speaks of insects finding their way to minute nectar-glands on leaves, to small and dingy flowers, and as indifferently visiting the variously colored flowers of the same species, or after the petals had fallen; and he observed bees paying no attention to flowers during the intervals when the sun was not shining, so as to bring out the odor. The heavenly combinations, harmonies, and delicate perfections of beauty in many flowers have no explanation in the senses and supra-œsophageal ganglia of insects. Besides, there is abundant beauty in leaf, stem, fungus, moss, sea-weed, and microscopic features, with which insects have nothing to do.

REPROMULGATE, v. *rē'prō-mūl'gāt* [*re*, and *promulgate*]: to promulgate again.

REPROOF: see under REPROVE.

REPROVE, v. *rē-prōv'* [F. *réprouver*, to reject, to disallow—from L. *reprobāre*, to condemn (see REPROBATE)]: to reprimand; to chide; to blame or censure; to rebuke. REPROV'ING, imp. REPROVED', pp. *-prōvd'*. REPROV'ER, n. *-ėr*, one who reproves. REPROV'ABLE, a. *-prōv'ā-bl*, deserving censure; blamable. REPROV'ABLY, ad. *-blē*. REPROV'INGLY, ad. *-lē*. REPROOF', n. *-prōf'*, blame expressed to the face; censure; in *Old.*, slander.—SYN. of 'reprove': to blame; censure; check; chide; reprehend; refute; rebuke; scold; reprimand;—of 'reproof': rebuke; censure; blame; admonition; reprehension; chiding.

REPRUNE, v. *rē-prōn'* [*re*, again, and *prune*]: to prune a second time.

REPTANT, a. *rep'tănt* [L. *reptans* or *reptan'tem*, creeping, crawling; *reptāre*, to creep (see REPTILE)]: in *bot.*, creeping. REPTATION, n. *rep-tā'shŭn*, in *zool.*, the act of creeping or crawling.

REPTILE, n. *rĕp'tĭl* [F. *reptile ;* It. *rettile ;* Sp. *reptil,* a reptile—from L. *reptilis,* creeping—from *reptārĕ,* to creep along, to crawl; *repo, serpo,* I creep: Gr. *herpō,* I creep]: an animal that creeps on its belly, or moves along by means of short legs, as snakes, lizards, etc.; a grovelling mean creature: ADJ. moving on the belly, or by means of small feet or legs. REPTILIA, n. plu. *rĕp-tĭl'ĭ-ă,* the systematic name for the cold-blooded vertebrate animals that never possess gills—including tortoises, snakes, lizards, and crocodiles. REPTIL'IAN, a. *-ĭ-ăn,* belonging to the reptiles or reptilia: N. one of the reptilia.—*Reptiles* are a class of Vertebrates distinguished from Amphibians (q.v.) by never possessing gills, but by breathing by lungs throughout life, by the usual presence of an exoskeleton, by possession of only one occipital condyle, and by numerous other characters—chiefly osteological. They agree in structure much more closely with birds, which Huxley has shown to present only a modification of the reptilian type, and with which he has accordingly united them into the group *Sauropsida.* They are distinguished from birds chiefly by the exoskeleton taking the form of scales or scutes, but never of feathers, by the forelimb possessing more than three digits, by the slight development of the pelvis, the separateness of the metatarsal bones, and the cold blood. They are divided into nine orders, of which the first four only exist at the present day, and the remaining five are extinct: 1. *Lacertilia* (lizards, chameleons, blind-worms, etc.); 2. *Crocodilia* (alligators, crocodiles, gavials); 3. *Ophidia* (snakes); 4. *Chelonia* (tortoises and turtles); 5. *Ichthyosauria* ('fish-dragons'); 6. *Plesiosauria* (the so-called 'swan-dragons'); 7. *Dicynodontia* (with walrus-like teeth); 8. *Pterosauria,* or pterodactyls (the so-called 'flying dragons'); and 9. *Ornithoscelida,* or bird-like reptiles (iguanodon, etc.), which were almost perfectly intermediate between the ordinary reptiles and the birds.

Except the tortoises, the reptiles in general are of elongated form, the body being often nearly cylindrical, and usually terminating in a very long tail. In a considerable number (as the serpents and some of the lizards), no traces of limbs are apparent; in some (as certain lizards), the limbs are rudimentary; while in the remainder the limbs are fully developed, though not to the extent to which development takes place in birds or quadrupeds, as the feet rarely suffice to keep the belly from the ground. The outer covering of the body presents several well-marked varieties. In a few of the lizards, the skin is covered with regular scales, composed of a mixture of bony and horny matter, and lying over each other like those of fishes; in most lizards and in serpents, there are scales and plates developed on the surface of the corium or true skin, and covered over with epidermis, which is thrown off at intervals, the moult forming an accurate cast of the body of the animal; while in the crocodiles and tortoises the scales are con-

verted into true bony plates, which in the former are embedded in the tissue of the skin, and in the latter are united with the ribs, sternum, etc., of the internal skeleton, to form the complete bony case into which the head and limbs of the animal can be retracted.

The skeleton is completely ossified in all reptiles, and presents to the philosophical anatomist many points of interest, for which space here is lacking. In the skeleton of the crocodiles and lizards, there is an obvious distinction of the regions of the neck, trunk, and tail. The total number of vertebræ is often great, but it is

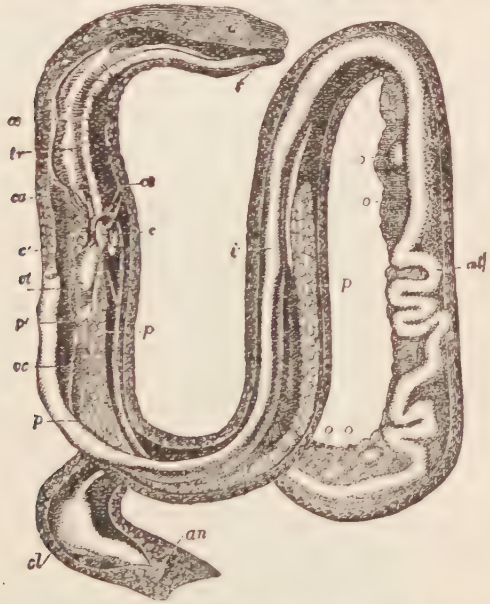


Fig. 1.—Anatomy of a Serpent.

t, tongue and glottis; *œ*, œsophagus (partly removed to show heart, etc.); *tr*, trachea; *ca*, *ca*, carotid arteries; *e*, left auricle; *e'*, right auricle; *ct*, ventricle of heart; *oc*, vena cava inferior; *p*, *p*, principal lung; *p'*, rudimentary lung; *i*, stomach; *int*, intestines; *cl*, cloaca; *an*, anus; *o*, ovary; *o'*, *o'*, ova.

chiefly in the caudal region that the excess occurs; there being 36 caudal vertebræ in the crocodile, and 115 in the monster lizard. In the serpents, the vertebral column is more abundantly sub-divided than in any other animal; the number of vertebræ in the python being 422, of which about six-sevenths possess ribs articulated to their bodies by a ball-and-socket joint. By the motion thus allowed to the ribs, they become in some degree instruments of progression. In the reptiles generally (excepting the tortoises), one surface of each centrum (or body) of the vertebræ is concave, and the

other convex; while in the tortoises these surfaces are flat. The true skull is small, the bulk of the head being made up by the jawbones. As the sutures separating the individual bones never become obliterated, the reptilian skull is well adapted to illustrate the true structure of the vertebral skeleton. In fig. 3 is the skull of the crocodile; in fig. 4, that of a serpent; and in both, the corresponding bones are indicated by the same

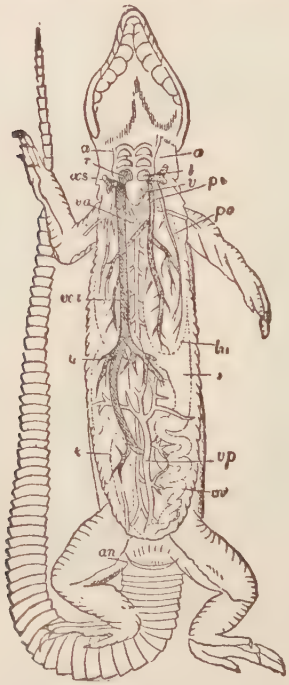


Fig. 2.—Anatomy of Lizard:
a, *a'*, arches of the aorta; *r*, right auricle; *l*, left auricle; *v*, ventricle; *vcs*, vena cava superior; *vci*, vena cava inferior; *va*, ventral aorta; *pv*, pulmonary veins; *pa*, pulmonary arteries; *lu*, lung; *li*, liver and hepatic vein; *k*, kidneys and renal vessels; *vp*, vena portæ; *s*, stomach; *int*, intestines; *au*, anus.

references. 1 is the *principal frontal*, divided in the serpent into two parts; 2, 2 are the *anterior*, and 4, 4 the *posterior frontals;* 7 is the *parietal bone*, usually single in reptiles; 12, 12 are the *mastoid bones* (homologous to the mastoid process in man); 17, 17 are the *intermaxillaries;* 18, 18 are the *maxillaries;* 20, 20 are the *nasals;* 23 is the *temporal bone* (corresponding to the squamous portion of the human bone); 34, 35, 36, 37 are the *dental*, the *articular*, the *angular*, and the *opercular* portions of

the *inferior maxilla*, or lower jaw; *a* is the *tympanic bone*, which supports the drum of the ear; *b* is the *zygomatic* or *malar* bone; and *c, c* the *lachrymals*. The lower jaw (except in the tortoises) presents the peculiarity of being composed of a number of separate pieces; there being four or five in each half-jaw in serpents, while in croco-

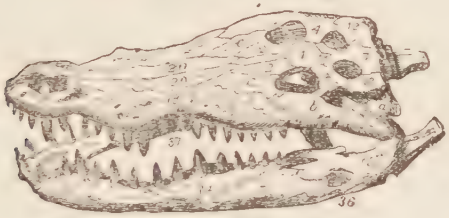


Fig. 3.—Skull of Crocodile.

diles and lizards each half is divided into at least five, and generally six pieces, which are united by suture. The four most important of these are shown in fig. 3. The purpose of this arrangement is probably (as Dr. Buckland suggested in his *Bridgewater Treatise*) to diminish the risk of fracture, which would otherwise attend the snapping together of their elongated jaws.

The bones of the extremities, except in the serpents, which have no limbs, correspond with those occurring in the higher Vertebrata.

The mouth, except in the Chelonians, is usually provided with conical teeth, adapted rather for seizing and holding prey, than for dividing and masticating food.

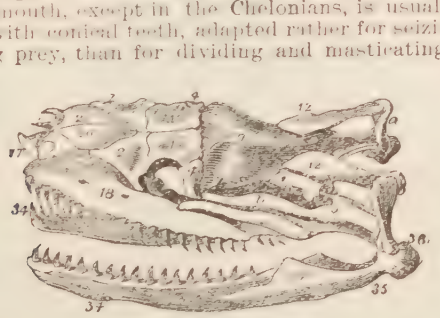


Fig. 4.—Skull of Serpent.

These teeth, like those of fishes, are successional; that is to say, new teeth are being constantly developed, while the older ones are regularly shed. In the crocodiles, three or even four generations of teeth, sheathed one within the other, may often be seen in the same socket. In some instances, the teeth are attached solely to the jaws, while in others they are attached also to the pterygoid or palate bones. In Chelonians, the teeth are replaced by a horny beak, which, according to the habits of the animal, is adapted for bruising as well as

cutting, and which in some species constitutes a somewhat formidable weapon.

The digestive organs present less marked differences than the osseous system. With the exception of certain Chelonians, all reptiles are carnivorous, and swallow their prey whole. Hence the jaws are adapted, by their mobility and sub-division into segments, to open very widely, and the œsophagus is capable of great dilatation. The tongue is commonly free, elongated, and bifid, except in the crocodiles, in which it is immovable; whence the popular idea that these animals do not possess this organ. The stomach is sometimes scarcely larger than the œsophagus and intestines (as in serpents), while in other cases it forms a sac of considerable size. In either case, it is capable of great dilatation. A liver, pancreas, and spleen are always present, the two former glands pouring their secretions into the upper part of the intestine, which is short, wide, and not much twisted, and divided into two portions, corresponding to the small and large intestines of mam-

Fig. 5.—Section of the Lung of the Turtle (reduced).

mals, by a valve. It terminates in a wide cloaca, into which the ducts of the urinary and generative organs usually open. The anal aperture of this cloaca is *transverse* in serpents and lizards, and *longitudinal* in crocodiles and tortoises. These peculiarities in the anal aperture are accompanied by remarkable differences in the external generative organs of the male, and seem to divide the class into two great sections.

It is in their circulating and respiratory organs that reptiles present the most marked characteristics. Like birds and mammals, they breathe air; but like fishes, they are cold-blooded. The reason why they are unable to sustain a fixed temperature above and independent

of that of the surrounding medium is due partly to the arrangement of the blood-vessels (see CIRCULATION), and partly to the structure of the lungs. The lungs are usually of large size; but as they are not sub-divided, as in mammals and birds, into innumerable microscopic air-cells, the real aërating surface is comparatively small. In several orders, they are merely capacious bags, whose vascular or aërating surface is but slightly increased by sacculi developed in their cells. In serpents, the pulmonary arrangement is singular, one lung (usually the right one) being of extraordinary length, while the other remains altogether rudimentary. It is in the tortoises and crocodiles that the lung is most highly developed; but if the reader will compare the accompanying figure of the lung of the turtle with a section of any mammalian lung, he will at once perceive the striking difference. This inferiority of the respiratory apparatus of reptiles is further shown in the absence of those means for continuous introduction and expulsion of air which are observed in birds, and still more in mammals (see RESPIRATION).

The cerebral portion of the *nervous* system in many respects resembles that of fishes, but the cerebral hemispheres are larger in proportion to the optic lobes, while the cerebellum is usually smaller. The organs of the senses are better developed than in fishes. The eye is always present in reptiles, and presents no remarkable peculiarity. We here first meet with a special arrangement for protection of this delicate organ; 'for while in serpents the skin of the head passes continuously in front of the eyes, merely becoming transparent where it covers the cornea, it is doubled in most other reptiles into two folds, constituting the upper and lower eyelids, which can be drawn together by a sphincter muscle; and we also find a rudiment of a third eyelid, formed by an additional fold of membrane at the inner angle, which is so completely developed in crocodiles as to form a nictitating membrane, that can be drawn completely across the eye, as in birds, by a muscle specially adapted for that purpose.'—Carpenter's *General and Comparative Physiology*, 3d ed. p. 495. The organ of hearing is more highly developed than in fishes or amphibia. There is no external auditory canal, the membrane of the tympanum being covered externally by the integument of the head. The senses of taste and touch are probably obtuse in most animals of this class, and from its structure the tongue is conjectured to be rather an organ of touch than of true taste.

Fig. 6.—Brain of Turtle: A, olfactive ganglia; B, cerebral hemispheres; C, optic ganglia; D, cerebellum.

All reptiles are *oviparous* animals. Certain species, however, retain their ova in a sort of uterine cavity, formed by dilatation of the oviduct near its termination in the cloaca, until the development of the embryo is so far advanced that the enveloping membrane bursts previously to the expulsion of the ova, so that the young are actually born alive—a mode of production to which the term *ovo-viviparous* is applied. The eggs are relatively large, and are furnished with a very large yolk, for the nutrition of the young animal. They are inclosed in a parchment-like shell, which contains very little calcareous matter. They are usually deposited in warm, sandy places, well exposed to the sun, or in dunghills, in which the heat induced by the putrefactive process facilitates the final stage of embryonic development. Lizards lay 8 to 12 eggs, serpents 10 to 50, tortoises 20 to 26, and crocodiles 20 to 60. In this respect they differ widely from the amphibia, some of which lay as many as 1,200 eggs. The common opinion that, after the expulsion of the eggs, the reptiles take no further care of their progeny, is erroneous. Crocodiles and lizards have been observed to watch the places which they have chosen as their nest; and the pythons (at all events, when in captivity) coil themselves around their eggs, and keep up a temperature considerably above that of the surrounding medium. The sexes are always separate; and the male generative organs, far more highly developed than in amphibians, present peculiarities which, in association with the position of the anal aperture, have been adopted by zoologists as a basis of classification.

In relation to their *habitat*, it may be observed that most of the tortoises and certain serpents are essentially aquatic animals (some inhabiting fresh, and some salt water), which rarely seek the land except to lay their eggs. Serpents, however, as a general rule, affect moist places in the neighborhood of water, though some are inhabitants of dry, sandy deserts. Lizards mostly frequent the sandy districts of hot and tropical regions, and either burrow in the ground or live in holes in trees, walls, etc. Reptiles generally predominate in the warmer regions of the globe, in which alone the largest kinds are to be found. In the northern countries, comparatively few species are found, and these pass a great portion of the year in Hibernation (q.v.) or torpidity. Dr. Carpenter assigns 2,000 as about the probable number of existing species of reptiles. Schinz states that in Europe there are 7 tortoises, 33 serpents, and 35 lizards. See Duméril and Bibron, *Erpétologie Générale, ou Hist. Nat. Complète des Reptiles* (Paris 1834–54, 9 vols.); also (for summary) Huxley, *Anatomy of Vertebrated Animals* (London 1871).

REPUBLIC, n. *rĕ-pŭb'lĭk* [F. *république;* It. *republica*, a republic — from L. *respublĭcă* — from *res*, a thing; *publĭcus*, belonging to the people]: state or country in which the supreme power is vested in rulers elected periodically by the people; a commonwealth. REPUB'LICAN, a. *-lĭ-kăn*, pert. to a republic; consonant to the principles of a republic: N. one who favors or prefers the government of a republic. REPUB'LICANISM, n. *-ĭzm*, attachment to a republican form of government; the principles on which it is founded. REPUBLIC OF LETTERS, a term applied to the whole body of literary and learned men.—A *Republic* is a political community in which the executive function is committed to a person or persons elected in some manner by the body of citizens entitled to vote. According to a very loose definition, a R. may vary from the most exclusive oligarchy to a pure democracy; but the term R. is not usually thus applied. The several republics of Greece and that of Rome were, at the outset at least, aristocratic communities. The mediæval republics of Venice, Genoa, and the other Italian towns also were more or less aristocratic: the sovereign power was held to be vested in the franchised citizens; and every function—legislative, executive, or judicial—not exercised directly by that body, could be exercised only by parties deriving their authority from it. But the extent of the franchise, and the mode of exercising it, varied much in these civic communities; and the most prosperous and long-lived was Venice, which was also the most aristocratic of them all. In the 16th c., the Seven Provinces of the Netherlands, on their revolt from Spain, adopted a republican form of government, as did Switzerland on becoming independent of the German empire. Great Britain was nominally a R. for eleven years (1649 to 60). France was a R. 1793 to 1805, and 1848 to 53; and the present R. was proclaimed 1870, Sep. 4. Such govt. as Spain had 1873, Feb.—1874, Dec. 31, was of republican form. Switzerland also is a R.; since 1848 more democratic than formerly. The other republics of Europe are the diminutive states of San Marino and Andorra; some republican elements were till recently traceable in the constitution of the free cities Hamburg, Bremen, and Lübeck. The most important of modern republics is that of the United States of America—dating from its separation from Great Britain. It is not at all an absolute or pure democracy, though its government involves some strongly democratic elements. Mexico, except during the short-lived empire 1863–67, has been a R. since 1824. Ten republics at present exist in S. America—Peru, Chili, Paraguay, Bolivia, Colombia or New Granada, Venezuela, Ecuador, Uruguay, the Argentine Confederation, and Brazil.—In the republics of the ancient world, the franchised classes exercised their power directly, without any system of delegation or representation. The same was at first the case in the Swiss cantons, where, however, representative government has been gradually

introduced. Modern republics have been founded on the representative, not the direct, system, which can hardly exist except in a community that is very small and concentrated as to space. Switzerland is a *federal* R.; the United States also is sometimes so termed; but is rather a *united* R. of many republics—a unique political entity, constituting a single nation under one of the strongest central governments anywhere known; yet with the immense powers of that government strictly defined within a narrow range, while reserving to each several state the broad sphere of government concerning its individual affairs. See CONSTITUTION OF THE UNITED STATES: FEDERAL GOVERNMENT.

REPUBLICAN FORK, or REPUBLICAN RIVER: stream rising in n.e. Colo., flowing through deep cañons and majestic scenery, and through the n.w. part of Kan. into Neb. where it pursues an e. course and drains the s.w. counties, and then again enters Kan. about 150 m. from the e. border of the state. It receives numerous tributaries, some of which, as Medicine Lane Creek, White Man's Fork, and Rock Creek, are of considerable size. By its union with the Smoky Hill it forms the Kansas river, in the state of Kansas. Total length more than 400 miles.

REPUB'LICAN PARTY: see POLITICAL PARTIES.

REPUBLICATION, *rē-pŭb'lĭ-kā'shŭn* [*re*, again, and *publication*]: a new publication of something formerly published.

REPUBLISH, v. *rē-pŭb'lĭsh* [*re*, again, and *publish*, to publish a new edition of a work. REPUB'LISHING, imp. REPUB'LISHED, pp. *-lĭsht*.

REPUDIATE, v. *rē-pū'dī-āt* [L. *repudiātus*, repudiated —from *repudium*, a separation, a divorce: It. *repudiare*: F. *répudier*]: to disclaim; to disavow; to discard: to divorce; to refuse to pay or acknowledge any longer, as a debt. REPU'DIATING, imp. REPU'DIATED, pp. REPU'DIATOR, n. *-ā-tėr*, one who repudiates. REPU'DIABLE, a. *-ā-bl*, that may be rejected; fit or proper to be put away. REPU'DIA'TION, n. *-ā'shŭn* [F.—L.]: disavowal; rejection; divorce. REPU'DIA'TIONIST, n. *-ist*, one who disavows liability for debt incurred by a predecessor in office, etc.—SYN. of 'repudiate': to disavow; deny; disown; disclaim; divorce; renounce; discard; reject.

REPUDIA'TION OF DEBTS, GOVERNMENTAL. The earliest and only financial failure of the United States was that of its paper currency during the revolutionary war, of which over $200,000,000 had been issued when, 1780, it ceased to circulate as of no value. To the extent that the national govt.—not then fully formed—cancelled debts with this paper money, without redeeming the paper, it repudiated its obligations.

About 1830–40 the debts of various states of the Union assumed serious proportions. The aggregate, 1830, before an era of unwise expenditure set in, was not over $13,000,000. Twelve years later it had reached $213,777,916, divided as follows: middle states, $73,348,072; southern states, $73,340,017; western states, $59,931,553; eastern states, $7,158,274. Foreign investors were the chief holders of American securities, and Pres. Van Buren said, 1840, that the outstanding bonds called for $12,000,000 annually to pay interest—'a sum exceeding half of the ordinary revenues of the whole United States.' Ind., 1841, with not over 100,000 voters, and hardly $3,000,000 of capital employed in trade, was burdened with an interest charge of $1,000,000 a year: the result was hopeless insolvency. Ohio also, 1841, was hardly less deep in difficulties, but, with immense resources and a people of great honesty and energy, managed to make good her credit. Of all the state debts, 1840, Penn. had the largest, $31,000,000: it reached, 1843, nearly $38,000,000. The Philadelphia bank of the U. S. suspended for the third and last time, 1841. It was found to have been plundered by its officers; and that jobbery, favoritism in agencies, and mismanagement had run riot. In Aug. the state failed to pay interest due on its bonds, with the effect of great feeling in England against America, and a permanent loss to Philadelphia of financial prestige, the advantage of which to New York was very great.

The earliest actual repudiation of state debts was by Miss. 1841, July 14, Gov. McNutt (gov. 1837–41), under whose sanction (by signature to legislative acts 1837 and 8) $15,500,000 of state bonds had been issued to the Miss. Union Bank, declared his opinion that the first $5,000,000 had been unconstitutionally issued. Under Mc-

Nutt's successor, T. M. Tucker (gov. 1841–43), elected as an original opposer of the issue of these bonds, their repudiation was an accepted fact, which the legislature indorsed by a resolution 1842. In 1875, when $7,000,000 of the Union Bank and other bonds were still outstanding, on which no interest had been paid since 1842, the legislature adopted, and the subsequent legislature ratified, an amendment to the state constitution, prohibiting payment on 'any bond or bonds now generally known as Union railroad or Planters' Bank bonds.'

The debt of Va., at the close of the civil war, was about $41,000,000. The interest account 1866 stood at $2,250,000. A funding scheme, 1870–1, made the coupons of a new issue, receivable for taxes, a favor to the state's creditors, which the next legislature repealed; and when the courts decided against this, a tax of ½ per cent. was laid on the funded bonds, and, under the name 'readjustment,' repudiation found supporters. The interest account was $3,000,000 in arrears 1875; and 1876 the outstanding bonds amounted to $29,489,326.38. A refunding act was passed 1878, Mar. 11, providing for 18-year and 32-year 3-per-cent. and 4-per-cent. non-taxable bonds. Early in 1879 the McCulloch bill for refunding $8,491,961 was passed. The readjusters now met in convention, and at the election of 1879, Nov., their vote was 77,070, to 69,736 debt-payers. At the session of 1879–80 a bill of which H. H. Riddleberger was author was passed, repudiating over $13,000,000 of state debt, but this Gov. Holliday vetoed. Gen. William Mahone, the readjuster leader, was elected U. S. senator for 1881–87, and H. H. Riddleberger was later chosen senator for 1883–89, the readjusters' fusion having elected their candidates for state offices and a majority of the legislature. Acts were then passed against taking the coupons on state bonds for taxes, as a means of repudiation of the debt confessed by the bonds. See VIRGINIA.

The state debt of Tenn., after the war, stood at about $43,000,000, of which $20,000,000 were disposed of by sales of railroad property. From 1875, when the interest account was greatly in arrears and bonds falling due could not be paid, measures of readjustment began to be considered; and 1877, Dec., a bill passed the house, but not the senate, for retiring the old bonds at 40 per cent. of their face value. Gov. Porter, a year later, reported over $20,000,000 in bonds outstanding, of which $11,000,000 had been declared invalid. A bill was finally passed, 1879, March 28, retiring most of the bonds at 50 per cent., in exchange, by agreement with creditors, for state 'fours.' The election of 1879, Aug. 7, however, went against ratification of this. Another act was passed 1881, May 19, under which less than half the old bonds were exchanged, at 60 per cent. of their face value, for bonds bearing interest 3 per cent. for 2 years, 4 per cent. for the next 2 years, 5 per cent. for the next 2 years, and 6 per cent. thereafter. The election of 1882 was carried by read-

justers opposed to so much favor to creditors as that of the act of 1881; and an act was passed 1883 on the basis of the 1882 platform, and under this about five-sixths of an indebtedness of $27,786,066 had been funded 1885 into 30-year bonds. See TENNESSEE.

The constitutional convention of La., 1879, entertained a proposition to acknowledge about $4,000,000 of the state's bonds, issued under a funding act of 1874, Jan. 24, and to repudiate nearly $20,000,000. A debt ordinance was adopted for retiring bonds of 1874, carrying 7 per cent. interest, in exchange for new bonds on which the interest was to be 2 per cent. for 5 years, 3 per cent. for 15 years, and 4 per cent. thereafter; or holders might have 75 per cent. of their bonds in new 4-per-cent. bonds. The U. S. supreme court decided, 1883, March, that this act of 1880 violated the state's contract of 1874, but that there were no means to compel the state to carry out its contract. See LOUISIANA.

The debts created in Ga., under the managers of early reconstruction after the civil war, were repudiated 1877 to the extent of $6,000,000.

In 1876 Minn. had outstanding over $2,250,000 of $5,000,000 in bonds issued in aid of certain railroads; and the attempt was made by a committee of the legislature to show that these bonds need not be paid, according to the state guarantee of 1858. A bill of 1877, Mar. 1, was rejected by the people, and the disposition to repudiate ran a considerable course, until an act was carried 1880 exchanging the old bonds, at 50 per cent. of their face value, for 30-year 4½-per-cent. 'adjustment bonds,' and by the end of 1881 nearly all had been so exchanged.

REPUGN, v. *rē-pūn′* [L. *repug′no*, I fight against (see REPUGNANT)]: in *OE.*, to withstand; to resist. REPUGN′ING, imp. REPUGNED′, pp. *-pūnd′*.

REPUGNANT, a. *rē-pŭg′nănt* [F. *répugnant*—from L. *repugnans* or *repugnan′tem*, fighting against, opposing—from *re*, against; *pugno*, I fight: It. *repugnante*]: characterized by opposition or contrariety; adverse, with *to*; inconsistent; inimical; in *OE.*, disobedient. REPUG′NANTLY, ad. *-lĭ*. REPUG′NANCE, n. *-năns* [F.—L.], or REPUG′NANCY, n. *-năn-sĭ*, opposition of mind; resistance; aversion; dislike.—SYN. of 'repugnance': dislike; antipathy; hostility; hatred; aversion; reluctance; unwillingness; inconsistency; irreconcilableness; contrariety; resistance;—of 'repugnant': opposed; adverse; contrary; opposite; inimical; hostile; inconsistent; irreconcilable.

REPULSE, v. *rĕ-pŭls′* [L. *repulsus*, driven back; *repulsa*, a refusal, a denial—from *re*, back; *pello*, I drive: It. *ripulsa*]: to drive back by force; to repel: N. a being checked or driven back by force; refusal; denial. REPULS′ING, imp. REPULSED′, pp. *-pŭlst′*. REPUL′SER, n. *-sĕr*, one who repulses. REPUL′SION, n. *-pŭl′shŭn* [F.—L.]: the act of driving back; the power by which bodies or their particles, under certain circumstances, are made to recede from each other (see below). REPULSE′LESS, a. *-pŭls′lĕs*, that cannot be repelled. REPULS′IVE, a. *-ĭv*, tending to repulse; cold; reserved; forbidding. REPULS′IVELY, ad. *-lĭ*. REPULS′IVENESS, n. *-nĕs*, the quality of being repulsive or forbidding.

REPUL′SION: term for a hypothesis formerly much in use in physics to account for a group of phenomena; but which, like the terms Caloric, Luminous Corpuscles, and other crude hypotheses of mediæval times appears doomed to extinction. The apparent R. between the particles of a gas, in virtue of which it exerts pressure on the containing vessel, is now known to be due to motion (see HEAT). A wet cork and an oiled one, floating on water, repel each other—a phenomenon fully accounted for by capillary *attraction;* as is that of the apparent repulsion of mercury by glass, which is shown to be due to the fact, that mercury attracts itself more than it attracts glass. No one now believes that a balloon rises while a stone falls, because the balloon is repelled, and the stone attracted, by the earth: this is a very good example, because it clearly shows how apparent R. may be the result of attraction. The earth attracts the balloon *less* than it attracts an equal bulk of the medium (air) in which it floats; consequently, the pressure of the air on the balloon is more than sufficient to support its weight. The moon raises tides not only on the side of the earth nearest her, but also on the side furthest from her. No one imagines that she attracts the nearer water, and repels the further. We know that she attracts the nearer water more, and the further less, than she

attracts the earth; and that the apparent R. is thus merely a difference of attractions.

It is not quite so clear how we are to account generally for R. in Electricity (q.v.), Magnetism (q.v.), and electro-magnetism, though many of these phenomena are known (especially by the beautiful experimental researches of Faraday) to bear explanations precisely analogous to that of the balloon above alluded to. There are also very curious problems, apparently involving R., connected with the behavior of the tails of comets. But it is reasonable to expect that we shall soon be able to account for all these phenomena by simple differences of attraction on the body influenced and the medium which surrounds it. Our real difficulty will thus be reduced to the explanation of attraction itself, which, indeed, promises to be a problem of a far higher order of complexity. For an account of some modern speculations on this subject, see FORCE.

REPURCHASE, v. *rē-pėr'chās* [*re*, again, and *purchase*]: to buy back: N. the act of buying again what has been sold.

REPUTE, v. *rē-pūt'* [F. *réputer*, to repute, to esteem—from L. *reputārē*, to compute, to calculate—from *re*, again; *puto*, I think: It. *reputare*]: to estimate; to think; to hold; to reckon: N. character, either good or bad; established opinion; general estimation. REPU'TING, imp. REPU'TED, pp.: ADJ. reckoned; accounted. REPUTE'LESS, *-lĕs*, disgraceful; without repute. REPUTABLE, a. *rĕp'ū-tă-bl*, having the good opinion of men; held in esteem; respectable; honorable. REP'UTABLY, ad. *-tă-blī*. REP'UTABLENESS, n. *-bl-nĕs*, the quality of being reputable. REP'UTA'TION, n. *-tā'shŭn* [F.—L.]: good name; character either in good or bad sense in public opinion; credit. REPUTEDLY, ad. *rē-pū'tĕd-lī*.—SYN. of 'reputable': creditable; honorable; estimable; respectable;—of 'reputation': repute; regard; estimation; honor; fame; esteem: credit; character; renown.

REPU'TED OWN'ER, in English Law: bankrupt trader who apparently possesses goods which he is holding with the consent of the real owner. Because a trader's holding such goods is fitted to give the impression of a greater capital or stock than he possesses, and thereby to obtain for him greater credit, it is provided that the goods so held may be ordered by the bankruptcy court to be sold for benefit of the creditors.—In the United States it has been held usually that one having possession of and apparent title to goods cannot, on those grounds, give real title in them to a purchaser; but N. Y. statutes provide somewhat differently.

REQUA-BATTERY, n. *rē'kwa-băt'ėr-ĭ* [etym. doubtful]: a kind of mitrailleuse, consisting of a number of rifle breech-loading barrels arranged upon a horizontal plane on a light field carriage. They were much used in the attack upon Charleston 1863 by the U. S. forces under Gillmore.

REQUEÑA, *rā-kān′yâ :* town of Spain, in the modern province of Cuença, about 80 m. s.e. of the town of Cuença. Its people are employed in the manufacture of woolen, cotton, and silk fabrics. Pop. 10,500.

REQUEST, n. *rĕ-kwĕst′* [OF. *requeste ;* F. *requête*, a request—from L. *rēquisītus*, sought or searched for—from *re*, again; *quæsītus*, sought; *quærĕrĕ*, to seek]: a desire expressed to another for something to be granted or done; state of being desired; the thing asked or solicited; petition; prayer; entreaty; demand: V. to express a desire for; to solicit respectfully. REQUEST′ING, imp. REQUEST′ED, pp. REQUEST′ER, n. *-ėr*, one who requests, IN REQUEST, in demand; in credit or reputation. COURT OF REQUESTS, in England, an anc. court of equity, inferior to the court of chancery—abolished in the reign of Charles I. Various local tribunals, also so named, for recovery of small debts, have been superseded by the county courts.—SYN. of 'request, v.' to ask; solicit; petition; beseech; desire; beg; pray; entreat; supplicate; implore; crave.

REQUICKEN, v. *rē-kwĭk′ĕn* [*re*, and *quicken*]: in *OE.*, to reanimate; to inspire with new life.

REQUIEM, n. *rē′kwi-ĕm* [L. *requĭēs* or *requĭem*, rest, repose, as from labor, suffering, or care—from, *re*, again; *quiēs*, rest: F. *requiem:* It. *requie*]: dirge or grand and solemn musical service for the dead in the Rom. Cath. Church; consisting in the celebration of the mass *Pro Fidelibus Defunctis* (For the Faithful Departed), the first words of the Introit of which are *Requiem æternam.*

REQUIN, n. *rĕk′wĭn* [F.]: the white shark; the *Carchārĭas vulgāris.*

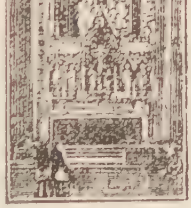
REQUIRE, v. *rē-kwīr′* [L. *requīrĕrĕ*, to want, to require—from *re*, back or again; *quæro*, I seek: F. *requérir*]: to ask, as of right or by authority; to demand; to claim; to call for; to make necessary; to need; in *OE.*, to request. REQUI′RING, imp. REQUIRED′, pp. *-kwīrd′.* REQUI′RER, n. *-rėr*, one who requires. REQUI′RABLE, a. *-ră bl*, capable of being required. REQUIRE′MENT, n. *-mĕnt*, demand; claim; in the plu., things for the supply of needs; necessaries.—SYN. of 'require': to enjoin; prescribe; order; demand; exact; direct; ask; need.

REQUISITE, a. *rĕk′wĭ-zĭt* [L. *requisītus*, needed, being requisite; *requīrĕrĕ*, to require—from *re*, back or again; *quæro*, I seek: It. *requisito*, requisite]: necessary; needful; essential: N. something required by the nature of things, or by circumstances; a want; a need. REQ′UISITELY, ad. *-lĭ.* REQ′UISITENESS, n. *-nĕs*, the state of being requisite or necessary. REQ′UISI′TION, n. *-zĭsh′ŭn* [F.—L.]: written request or invitation; demand; in international or interstate law, demand by the authorities of a state or nation on those of another for the rendering or extradition of an alleged criminal (see EXTRADITION). In *mil.*, a written demand for forage, food, arms, etc. It is closely related to contribution,

but differs from it in that the requisition is a demand for supply of food, animals, labor, etc., for the use of the party making it, while the contribution is a cash payment required either to furnish supplies to the invaders or to give them the means for carrying on the government. In common use, the term requisition often includes everything under the head of contribution. The old custom of imposing heavy fines on an invaded country has been greatly modified, and civilized nations have generally adopted the principle that in war the rights of private citizens should be respected, and that when it is necessary to take their property receipts should be given for the same in order that payment may be made after the war. REQUISITION, v. to make a requisition upon; to demand; to ask. REQUISITIVE, a. *rē-kwiz'ĭ-tĭv*, expressing or implying demand.—SYN. of 'requisite, a': necessary; essential; needful; indispensable.

REQUITE, v. *rē-kwīt'* [*re*, again, and *quit*]: to make a return for treatment, either good or evil; to repay; to recompense; to avenge. REQUI'TING, imp. REQUI'TED, pp. REQUI'TER, n. *-tĕr*, one who requites. REQUI'TAL, n. *-tăl*, the act of requiting; return for treatment, good or bad; retribution; recompense.—SYN. of 'requite': to compensate; pay; repay; remunerate; reward; recompense; satisfy; punish; retaliate.

REREDOS, n. *rēr'dŏs* [F. *arrière*, behind; *dos*; L. *dorsum*, the back]: in *arch.*, wall at the back of an altar, seat, large fireplace, etc.; screen; partition wall. In churches, the R. is usually in the form of a screen behind the altar, and rising 3 to 6 ft. above it, detached from the e. wall, and invariably ornamented with niches, statues, etc., or with paintings or tapestry. Very fine examples are at Durham, St. Albans, etc., in England; in Trinity Church, New York; and other churches.



Reredos, Salisbury Cathedral.

REREE, n. *rĕr'ē:* a plant, *Typha angustifolia*, the leaves of which are used in the N. W. Provinces of India for making mats.

REREMOUSE, n. *rēr'mows* [AS. *hreremus*, a bat—from AS. *hreran*; Icel. *hræra*; Ger. *rühren*, to stir]: the bat: also spelt REARMOUSE.

RE-RESOLVE, v. *rē'rē-zŏlv'* [*re*, again, and *resolve*]: to resolve a second time.

REREWARD, n. *rēr'wawrd* [from *rear*, and *ward*]: the part of an army which marches in the rear.

RES, n. *rēz* [L. a thing]: a thing; a matter; a point; a cause or action. Used in legal phrases, as *res gestæ*, things done; *res judicata*, a matter already adjudicated upon.

RESACA DE LA PALMA, *rā-sâ'kâ dā lâ pâl'mâ*, BATTLE OF: engagement, in the Mexican war, 1846, May 9, in a ravine (from which the battle is named) which crosses the Matamoros road about three m. from the Rio Grande. The battle ground, thickly covered with palm trees, was in Cameron co., Tex. The Mexican force, led by Gen. Arista, numbering 6,000 men, was quickly defeated by 2,000 U. S. troops under Gen. Taylor.

RESAIL, v. *rē-sāl'* [*re*, again, and *sail*]: to sail back.

RESALE, n. *rē'sāl* [*re*, again, and *sale*]: a second sale.

RESALUTE, v. *rē'să-lūt'* [*re*, again, and *salute*]: to salute or greet anew.

RESCIND, v. *rē-sĭnd'* [F. *rescinder*—from L. *rescindĕrĕ*, to abolish, to rescind—from *re*, back or again; *scindĕrĕ*, to cut, to split: It. *rescindere*]: to render null or make void; to revoke; to repeal. RESCIND'ING, imp. RESCIND'ED, pp.—SYN. of 'rescind': to abrogate; annul; reverse; void; vacate; revoke; repeal; recall.

RESCISSION, n. *rē-sĭzh'ŭn* [F. *rescision*—from mid. L. *rescissīōnem*, an annulment, as of deeds—from L. *rescissus*, abolished: It. *rescissione*, rescission (see RESCIND)]: act of abrogating or annulling. RESCISSORY, a. *rē-sĭs'sĕr-ĭ* [mid. L. *rescissōrĭus*]: having power to rescind.

RESCRIBE, v. *rē-skrīb'* [L. *rescrībĕrĕ*, to write in reply to—from *re*, again; *scrībo*, I write]; to write back; to write over again. RESCRI'BING, imp. RESCRIBED', pp. *-skrībd'*.

RESCRIPT, n. *rē'skrĭpt* [L. *rescriptus*, answered in reply to—from *re*, again; *scriptus*, written; *scrībo*, I write]: an answer in writing: eminently, the answer of a pope or an emperor to one consulting him on any question of jurisprudence officially propounded to him. *Rescripta principis* were one of the authoritative sources of the civil law, and consisted of the answers of the emperor to those who consulted him, either as public functionaries or as individuals, on questions of law. They were often applied for by private persons, especially women and soldiers, to solve their doubts or grant them privileges. The rescripts directed to corporate and municipal bodies were known as *Pragmaticæ sanctiones*, a name which has found its way into the public law of Europe: see PRAGMATIC SANCTION. Rescripts might gradually come to have the force of law, so far as their determinations in particular cases were of general application. RESCRIPTION, n. *rē-skrĭp'shŭn* [F.—L.]: the answering of a letter

RESCUE, v. *rĕs'kū* [OF. *rescousse*, a rescue; *rescousse*, to recover: It. *riscuotere*, to fetch a thing out of pawn, —from L. *re*, back or again; *excutĕrĕ*, to take away by force—from *ex*, out; *quatĕrĕ*, to shake, drive]: to set free from danger or restraint; to deliver from evil in any way; to recapture; to liberate: N. deliverance from danger or restraint; release; liberation; recapture; in *law*, illegal delivery and discharge of a prisoner or of goods out of the custody of the law. If, e.g., a tenant whose goods are distrained for rent, take them by force from the officer, the distrainer has right of action against the tenant or person who rescues the goods. When a prisoner is in custody for felony, and is rescued, the rescuer commits a felony. RES'CUING, imp. RES'CUED, pp. *-kūd*. RES'CUER, n. *-kū-ĕr*, one who rescues.—SYN. of 'rescue, v.': to liberate; recapture; retake; deliver; save; free.

RESEARCH, n. *rē-sĕrch'* [*re*, again, and *search*: comp. F. *recherche*, inquiry, search]: a laborious or continued search after facts or principles; investigation; examination.—SYN.: inquiry; scrutiny; examination; investigation.

RESEAT, v. *rē-sēt'* [*re*, again, and *seat*]: to seat anew.

RESECTION, n. *rē-sĕk'shŭn* [*re*, again, and *section*]: the act of cutting or paring off. RESECTION (or EXCISION) OF A JOINT: surgical operation in which the diseased bone of a joint is cut out, instead of cutting off the whole limb. Dr. Druitt, in *The Surgeon's Vade-mecum*, remarks, that 'it seems to be established that excision is on the whole safer than amputation; less violence is done to the body, fewer great arteries and nerves are injured, and, what is of more consequence, fewer large veins are divided, and as the articular end of the bone only is sawn off, and the medullary canal not touched, there is less chance of pyæmia. Lastly, the patient is left with an imperfect limb, it is true, but with one which, in most cases, is highly useful.' The operation has been performed on the ankle-joint, the elbow, hip-joint, knee and shoulder. There was long discussion among surgeons as to applying this operation to the knee-joint. The operation was performed first in 1762; and to 1830, there are records of 19 cases, of which 11 died. 1830–50 the operation was never performed, and was generally condemned; but 1850 it was revived by Prof. Fergusson, and is now frequent. 'The cases,' says Dr. Druitt, 'in which it ought to be performed are, generally speaking, such cases of injury or disease as would otherwise be submitted to amputation. The *object* of the operation is to produce a firm and useful limb, slightly shortened, and with entire bony union or fibrous union, admitting of some small degree of motion at the situation of the joint. But all cases are not suitable for excision; and those cases are unsuitable and better adapted for amputation in which either the *quantity* of the diseased bone is very great (for then the case will probably not do well, or, if

it proceed to recovery, and the patient be young, the future growth of the limb will be prevented), or the *quality* of the disease may be such as experience has shown to be incompatible with the exudation of healthy material of repair.' In at least 50 per cent., the operation results in a good useful leg. It must be regarded as one of the triumphs of modern surgery.—See Prof. Fergusson's *Lectures on Conservative Surgery;* Buck's *Reference Handbook of the Med. Sciences*, N. Y., 1889.

RESEDA, n. *rē-sē'dă* [L. *resēda*, the mignonette—from *resēdo*, I calm or appease, so called from its supposed virtues as an external application]: genus of favorite flowering plants known as mignonette, ord. *Resedāceæ*. RESEDACEÆ, natural order of exogenous plants, mostly herbaceous; having alternate leaves; terminal spikes of hermaphrodite irregular flowers; the calyx of 4–7 unequal segments; the corolla of 4–7 petals, alternate with the segments of the calyx, the lower petals entire, the upper much cut; the stamens 10–30, inserted on a fleshy receptacle; the germen free, one-celled; the fruit a many-seeded capsule, three-horned, and often open at the apex, so as to expose the seeds, which are kidney-shaped. There are about 40 known species, mostly natives of Europe and w. Asia, and mostly mere weeds. Weld (q.v.), otherwise called Dyer's mignonette, and common Mignonette (q.v.), are the noticeable species.

RESEEK, v. *rē-sēk'* [*re*, again, and *seek*]: to seek again.

RESEIZE, v. *rē-sēz':* to seize a second time. RESEIZURE, n. *rē-sēzh'ûr*, the act of seizing again.

RESELL, v. *rē-sĕl'* [*re*, again, and *sell*]: to sell again what has been bought or sold.

RESEMBLE, v. *rĕ-zĕm'bl* [OF. *resembler*—from L. *re*, again; *simulārĕ*, to make like—from *simĭlis*, like: F. *ressembler*]: to be like; to possess similar external form or structure; to possess like or similar qualities; in *OE.*, to liken. RESEM'BLING, imp. RESEM'BLED, pp. *-bld.* RESEM'BLANCE, n. *-blăns*, likeness; state of having similar external form or structure; image; similarity.—SYN. of 'resemblance': likeness; representation; image; similarity; similitude; semblance.

RESEND, v. *rē-sĕnd':* to send again or back.

RESENT, v. *rē-zĕnt'* [F. *ressentir;* It. *risentire*, to resent—from L. *re*, again; *sentīrĕ*, to feel]: to have a deep sense of; to take ill; to consider as an injury or an affront; to be somewhat provoked at. RESENT'ING, imp. RESENT'ED, pp. RESENT'ER, n. *-ĕr*, one who resents. RESENT'MENT, n. *-mĕnt* [F. *ressentiment*]: the feeling of anger or irritation caused by a sense of injury or insult; anger; prolonged anger. RESENT'FUL, a. *-fŭl*, easily provoked to anger, and retaining it long. RESENT'FULLY, ad. *-lĭ*.—SYN. of 'resentment': irritation; anger; vexation; displeasure; grudg ; wrath; rage; fury; indignation; choler; gall; ire.

RESERVATION, MENTAL [Lat. *reservatio* or *restrictio mentalis*]: act of reserving or holding back some word or clause necessary to convey fully the meaning really intended by the speaker. It differs from equivocation (Lat. *equivocatio* or *amphibolia*) in this, that in the latter the words employed, though doubtful, and perhaps not fitted naturally to convey the real meaning of the speaker, are yet, absolutely speaking, and without the addition of any further word or clause, susceptible of that meaning. Thus, an example of an equivocation would be: 'I did not write this libel,' meaning, 'I did not perform the mechanical operation of *writing it with a pen*,' though I had really *composed* and issued it. A mental R. might be involved in the same words, if one were to say: 'I did not write this libel,' mentally withholding the word 'to-day,' though he had written it 'yesterday,' or on some earlier day. Few questions in casuistry have excited more controversy, or have been the subject of fiercer recrimination, than that of the lawfulness of equivocation and mental R. In the celebrated *Letters* of Pascal (q.v.) against the Jesuits, it was one of the most prominent, and as he used it, the most effective topics; and Pascal's charges against the Jesuit casuistry of that day have been repeated in almost every popular controversy on the subject since. There are several varieties of mental R., differing from each other, and all differing from equivocation under its several forms. But as regards the morality of the subject, all the forms of language calculated to deceive may be classed together, and may be tested according to the same common principles. Mental R. is of two kinds: *purely mental* and *not purely mental*. By the former is meant a mental R. which cannot be detected, whether in the words themselves or in the circumstances in which they are spoken. Of this kind, would be the mental reservation implied if a person, on being asked if he had seen A. B. (whom he really had just seen *walking* by), were to reply: 'I have not seen him,' meaning '*riding on horseback*.' A 'not purely mental' R. is that which, though not naturally implied or contained in the words, may nevertheless be inferred or suspected, either from them or from the circumstances in which they are used. Of this kind would be the mental R. of a servant, in giving the ordinary answer to a visitor's inquiry for his master: 'Not at home,' though his master were really in the house; or that of a confessor, who, in a country where the privileges of the secret of the confessional are known and admitted, on being asked whether a certain person had committed a crime, which the confessor knew from his confession that he had committed, should answer: 'I do not know,' meaning 'outside of the confessional.' And, in general, all such doubtful forms, whether of mental R. or of equivocation, may be divided into *discoverable* and *undiscoverable*. Much, though certainly not all, the odium against the casuists for their teaching on this head, has arisen from the con-

fusion of their views as to these two classes of mental R.; and the witty ingenuity with which Pascal mixed examples of both, and applied to one what was really said of the other, did more to damage the theological reputation of his adversaries, as a school, than any of the genuine really objectionable decisions which he cited from the writings of individual divines. Mental R. has formed a subject of discussion for Prot. as well as Rom. Cath. divines; but without entering into a detailed history of this branch of casuistry, we state briefly the chief principles on which the decisions of the most approved writers, especially of the Rom. Cath. school, are founded.

First, 'purely mental' reservations, and 'absolutely undiscoverable' equivocations, are held to be in all cases unlawful, such forms of speech being actually and only falsehoods; inasmuch as they have but one real sense, which is not the sense intended by the person who uses them, and hence can serve only to deceive. This doctrine is held by all sound Rom. Cath. casuists, and the contradictory doctrine is expressly condemned by Pope Innocent XI. (Propp. 26, 27). On the contrary mental reservations 'not purely mental, and 'discoverable' equivocations, are held to be not inconsistent with truth; and, in certain circumstances, when there is necessity or weighty reason for resorting to them, allowable. For the absolute admissibility of the expedient of mental R. and of equivocation in such circumstances, casuists allege Scriptural precedent from Gen. xx. 12; Matt. xi. 14; Acts xxiii. 6; and other passages; and the principles on which their use, in such case, is defended, are (1), that there is supposed to be in the circumstances justification, and even necessity, for not making known the whole truth; (2) that the mental R. in the case supposed does not amount to more than a mere *withholding the entire truth*, inasmuch as what is stated is true, and the real meaning of the speaker is *contained in it, and discoverable from it;* and the false construction put on it by the hearer, though permitted through necessity or grave reason by the speaker, is not *positively* put forward by him. A historical example of such equivocation or R. is in the well-known answer of St. Athanasius to the question of the party in pursuit of him, and who, overtaking him, but not knowing his person, asked what way Athanasius had gone: *He is not far off*, replied Athanasius, and the party passed on in pursuit. A less easily discoverable equivocation is ascribed to St. Francis of Assisi, who, when a gang of robbers in pursuit of a traveller asked him whether he had seen the traveller pass by, put his hand up the sleeve of his habit, and replied: 'He did not pass *this* way,' meaning, 'up his sleeve.' And an ordinary example of discoverable mental R. is that of a person who, being asked by one to whom he could not with safety give a refusal, whether he has any money, should reply: 'No,' meaning, 'none to lend to you.' In order, however, to justify

the use of these devices of speech, casuists require that there shall be some grave and urgent reason on the speaker's part; e.g., the necessity of keeping a state secret, or a secret of the confessional, or of a professional character, or even the confidence intrusted by a friend, or the ordinary and fitting privacy requisite for the comfort and security of domestic life, and for the peaceful intercourse of society; and that the concealed sense of the form of speech employed, though it may be *actually undiscovered*, and even unlikely to be discovered, may yet be, in all the circumstances, *really discoverable*. On these two leading theoretical principles, the majority of casuists are agreed. But a wide field for practical discussion lies between them, in the variety of senses which may be attached to the phrases 'not purely mental' and 'discoverable;' and it is in the practical interpretation of these terms that some of the casuists have found scope for introduction of the lax decisions which have brought odium on casuistry. Much of this odium has fallen upon the Society of the Jesuits, to such a degree, that their name has been popularly associated with the worst forms of the practice of mental R.: see JESUITS: PASCAL.—See Scavini, *Theologia Moralis*, ii. 23; Murray, *Theological Essays*, iv. 274, etc.

RESERVATUM ECCLESIAS'TICUM: a provision of the religious Peace of Westphalia, celebrated in German history. By this clause of the treaty of Westphalia (1549), it was enacted that if the holder of any ecclesiastical dignity, or of any territorial jurisdiction or property annexed to such ecclesiastical dignity, should change his religion, the dignity, territorial jurisdiction, or property held by him, should not be thereby alienated from the church from which he seceded, but should be still 'reserved' for that church, and for the legitimate successors of the seceder. It was chiefly out of the disputes regarding the violations of the R. E. that the Thirty Years' War arose.

RESERVE, n. *rē-zûrv'* [F. *réserver*—from L. *reservārĕ*, to reserve—from *re*, back; *servo*, I keep: It. *riservare*]: something kept in store for future use; in *mil.*, a body of troops kept in the rear of an army in action to give support where required, or to meet any contingency (see RESERVE, in Milit.): a laying up and keeping for a future time; reservation or exception, as, a sale by auction without *reserve*: something concealed in the mind; caution or restraint in personal behavior; shyness; in *OE.*, exception; prohibition; exception in favor: V. to keep in store for future use; to withhold from present use for another purpose; to retain; to keep. RESERV'ING, imp. RESERVED', pp. *-zêrvd'*: ADJ. restrained; shy; modest; not frank and open. RESERV'EDLY, ad. *-ĕd-lĭ*. RESERV'EDNESS n. *-ĕd-nĕs*, the state of being reserved; want of frankness or openness. RESERV'ER, n. *-ẽr*, one who reserves. RESERVATION, n. *rĕz'ẽr-vā'shŭn* [F.—L.]: the act of reserving or keeping back; state of being kept in reserve; concealment in the mind (see RESERVATION, MENTAL): exception in favor; something reserved: in *law*, term used in lease, also in grants of a less estate than the fee-simple, signifying the part not given away; used also in reference to rent, denoting a rent out of the premises which is reserved by the landlord for himself (see RENT). In *OE.*, state of being treasured up; custody. IN RESERVE, in keeping for other or future use; in store.—SYN. of 'reserve, n.': retention; limitation; reservation; coldness; shyness; modesty; backwardness; restraint; caution.

RESERVE', in Military and Naval Affairs: term with several meanings. In a battle, the R. is a body of troops held in the rear, generally out of fire, and kept fresh, that they may intervene with decisive force at any point where yielding troops require support, or an advantage gained needs powerful following up.—The R. of ammunition is a magazine of warlike stores, situated between an army and its base of operations, sufficiently retired from the front to be safe from sudden raids of the enemy, and at the same time advanced enough to allow of the supply actually in the field being speedily replenished.

The R. of a nation is that force on which the national

defense is thrown, when its regular armies have failed in securing its safety. This reserve may be the *levée en masse* of the whole adult male population, or it may consist of a smaller section of the people duly trained to arms. The latter is the preferable system, when the arms of scientific modern warfare are to be brought into action. In different countries, the reserves are organized on very different principles. In Great Britain, they comprise the army reserve, the enrolled pensioners—both of which consist of soldiers who have served in the army—the militia, yeomanry, volunteers, and trained constabulary. The numbers of the reserve forces provided for in the army estimates 1894–95, were as follows:

Reserves, first class	84,300
Reserves, second class	150
Militia	140,506
Yeomanry	11,750
Volunteers	262,520
Total	499,266

In the United States there is officially no army reserve under direct control of the war department; but the militia or national guard of the different states under the immediate control of the governors, constitutes an effective force which may be called into the general service by the respective governors on the order of the president. This force aggregated (1895) 93,107 inf.; 4,995 cav.; 6,374 artil.; total, 102,598, with 8,198 commissioned officers. The number of men available for milit. duty was 9,144,500.

The reserves of all grades in foreign navies 1891 were: Austria, 7,500; France, 150,000; Germany, 34,000; Great Britain, 55,000; Italy, 14,000; Netherlands, 3,500; Russia, 22,000; Spain, 6,700; and Sweden and Norway, 3,000–1,100.—In the United States, congress passed a bill, 1891, authorizing the organization of a naval militia in the seaboard states, the whole to form a national naval reserve; and at the time of writing the legislatures of N. Y., Mass., R. I., and Cal. had provided for such naval militia. See NAVAL RESERVE: also ARMIES: NAVIES, MODERN: VOLUNTEERS: MILITIA: WAR SERVICES: YEOMANRY.

RESERVED′ LIST, in the British Navy: device whose practical operation was the same as that of the Retired List (q.v.). Since 1870 it has become almost inoperative.

RESERVOIR, n. *rĕz'ér-vwawr'* [F. *réservoir*, a reservoir —from mid. L. *reservatōrĭum*, a storehouse—from L. *re*, again; *servo*, I keep or preserve]: receptacle for storing water for any purpose, but chiefly for supply of towns, driving machinery, feeding canals, irrigation, or some process of manufactures. Generally, every water-works' establishment, for the supply of a town, requires to construct one or more reservoirs for providing compensation to the mills situated on the stream, for the water abstracted from any of its feeders.

The most advantageous position for a storage R. is that where there is a narrow gorge in a valley widening out upward into a flat expanse, thereby enabling a comparatively small dam or embankment formed in the gorge to impound a large body of water; but in many cases where there is no such choice, the embankment may necessarily be placed across a wide part of a valley which narrows as it ascends, thereby requiring a great embankment, in proportion to the quantity of water impounded. Sometimes reservoirs have to be formed on flattish ground affording no great natural facilities for storing water; and in such cases they may require to be embanked wholly or nearly around. Where a R. must be constructed on perfectly level ground, the excavation must be calculated to be exactly equal to the embanking. The worst possible situation for a store reservoir is on the slope of a hill.

In many cases, natural lakes are used as reservoirs, means being adopted for raising or lowering the surface of the water, the difference between the lowest and the highest level of the lake's surface, multiplied by its area, being the measure of the available storage. The capacity of a R. necessary for making nearly the whole water of a district available for use, depends much on the climate. Where droughts are of long continuance, its capacity requires to be proportionally large.

As illustrative of the very different facilities afforded by different sites for storing water, an instance occurs of two reservoirs of the Edinburgh Water Trust, whereof

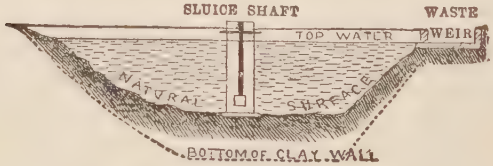


Fig. 1.—Elevation of Reservoir.

one with an embankment containing 175,000 cubic yards of earthwork impounds only 17 millions of cubic feet of water; while another, with an embankment of 53,000 cubic yards, impounds 85 millions of cubic feet, there being a single embankment across a valley in both cases. Generally, the structure for impounding water is an

earthwork embankment, with a slope toward the water of 3 or 4 horizontal to 1 perpendicular, a breadth across the top of 6 to 12 ft., the height being from 4 to 7 ft. above the water, and an outside slope of 2 to 2½ horizontal to 1 perpendicular. The earthwork ought to be formed in thin layers well rammed, and to have a puddle-wall of good well-worked clay in the centre, the foundation of the puddle being a trench dug down to impervious rock or clay. The face toward the water requires to be protected by stones; and when a R. is large, those stones must be 'pitched'—i.e., regularly set by hand—

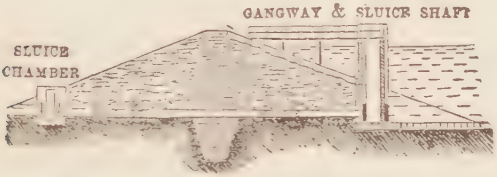


Fig. 2.—Transverse Section of Reservoir.

so as to be able to resist the lash of the wave. In all cases, there is imperatively required a waste-weir, to allow flood-waters to escape without risk of overflowing the dam. The weir ought, if possible, to be placed on the solid ground; and if it can be cut through solid rock, that is best, and saves great expense for masonry. The width of the waste-weir must be regulated by the catchment or extent of gathering-ground of the R., and by the rainfall of the district; but for a given catchment and rainfall, a R. having a small area ought to have a larger waste-weir than one having a larger area, as the latter would allow flood-water to accumulate without rising to so high a level as in the former. Generally, however, 12 to 20 ft. length of waste-weir may suffice for a sq. m. of catchment. In some cases, dams across gorges, for the purpose of forming reservoirs, are constructed of walls of heavy masonry, instead of earthwork embankments. Those across rivers for diverting the water into mill-lades, and for retaining the water which would otherwise be wasted at meal-hours, are constructed generally of stone, but sometimes of timber or iron.

The word dam is sometimes used incorrectly to indicate a R. or sheet of water, instead of the structure used to form the R., which is its proper meaning. A R. requires a sufficient outlet at the bottom by means of a tunnel, culvert, or iron pipes provided with suitable sluices, and these ought properly to be so arranged as that access can be had to them even when the R. is full.

Most of the disasters from the bursting of reservoirs have arisen from lack of sufficient waste-weirs, which occasions the embankments to be overtopped by the water, and the outer slope to be washed away, so as to

deprive the puddle-wall of its support; but some accidents have occurred from the outlet being by a wooden box or trough through the embankment, and that being neglected and allowed to get rotten.—The bursting of some reservoirs occurs from the embankment sinking to, and being allowed to remain at, a level actually below that of the waste-weir, so that the embankment is overtopped; and the bursting of others is due to a landslip under the embankment. For the most disastrous and destructive instance on record of the bursting of a R., see JOHNSTOWN (Penn.).

Distributing reservoirs for towns, used chiefly for storing the surplus water during the night, which otherwise might mostly go to waste, ought to hold at least half a day's supply, and ought to be placed high enough to command the highest parts of the town. They are usually built of masonry or brickwork, but are sometimes made of cast iron, and now of boiler-plate—in which last case they are best of circular form. In India and in s. Europe, where long droughts prevail, immense reservoirs have been constructed for supplying water for irrigation.

RESET, v. *rē-sĕt′* [OF. *recete*, *recepte*, something received (see RECEIPT)]: in *Scotch law*, to receive stolen goods: N. the offense of receiving and keeping stolen goods. RESET′TER, n. *-tĕr*, one who receives stolen goods.

RESET, v. *rē-sĕt′* [*re*, again, and *set*]: to set again, as a diamond; among *printers*, to set over again.

RESETTLE, v. *rē-sĕt′l* [*re*, again, and *settle*]: to settle again. RESET′TLEMENT, n. a second or new settlement.

RESHAPE, v. *rē-shāp′* [*re*, again, and *shape*]: to shape again.

RESHD: see RASHT.

RESHID′ PASHA′ (MUS′TAPHA MEH′EMED): see REDSHID PASHA.

RESHIP, v. *rē-shĭp′* [*re*, again, and *ship*]: to ship a second time; to ship again for another place what has been imported. RESHIP′MENT, n. the act of shipping again; goods reloaded and sent to another port.

RESIANT, a. *rĕz′i-ănt* [Norm. F. *reseant*, dwelling—from mid. L. *resĭans*, dwelling in a place: L. *resĭdens* or *resĭden′tem*, residing (see RESIDE)]: in *OE.*, resident; present in a place. RES′IANCE, n. *-i-ăns*, in *OE.*, residence; dwelling; abode.

RESIDE, v. *rē-zīd'* [F. *résider*—from L. *residēre*, to remain, to abide—from *re*, again; *sedēō*, I sit: It. *risedere*]: to continue in a place as an inhabitant; to abide; to live; to dwell. RESID'ING, imp. RESID'ED, pp. RESID'ER, n. *-ėr*, one who resides in a particular place. RESIDENT, n. *rez'i-dėnt* [F.—from L. *residens* or *residentis*, remaining, abiding]: dwelling or abiding in a place: N. one who resides or dwells in a place; an inhabitant; a public minister residing at a foreign court. RESIDENCE, n. *-dėns* [F.—L.]: act of residing; place where one resides; home; an abode; a mansion; also RESIDENCY, n. *-dėn-si*, an abode: the official dwelling of a government officer in India. RESIDENTIAL, a. *-den'shăl*, having actual possession; relating or pertaining to residence or residents. RESIDENTIARY, a. *-shėr-i*, residential: N. one who keeps a certain residence, as the canon of a cathedral.—SYN. of 'reside': to remain; live; dwell; abide; domicile; inhabit; sojourn; domiciliate; stay; house.

RESIDUE, n. *rez'i-dū* [F. *résidu*—from L. *residŭum*, a remainder—from *re*, back; *sedēō*, I sit: It. *residuo*]: that which remains after the greater part has been taken or separated; the rest; the remainder; the residuum; the remainder of an estate after payment of debts and legacies. RESIDUAL, a. *rē-zid'ū-ăl*, remaining after the greater part has been taken. RESID'UARY, a. *-ėr-i*, pertaining to the residue; that takes the residue or remainder of an estate after paying debts and bequests; entitled to the residue, as a *residuary legatee*: if the debts and the specific legacies exhaust all the funds, the residuary legacy is worth nothing. RESID'UUM, n. *-ŭm*, the residue; the remainder: plu. RESID'UA, *-ă*.—SYN. of 'residue': remainder; rest; remnant; balance.

RESIGN, v. *rē-sīn'* [*re*, again, and *sign*]: to sign again.

RESIGN, v. *rē-zīn'* [F. *résigner*—from L. *resignāre*, to resign—from *re*, back; *signare*, to mark, to sign—from *signum*, a mark: It. *risegnare*]: to give up, as a claim or an office; to yield into the hands of another; to submit without resistance or murmuring; to yield, as the will; to submit; to quit; to forsake. RESIGN'ING, imp. RESIGNED', pp. *-zīnd'*: ADJ. calmly submitting to the will of God. RESIGN'EDLY, ad. *-ĕd-li*. RESIGN'ER, n. *-ėr*, one who resigns. RESIGNATION, n. *rēz'ig-nā'shŭn* [F.—L.]: the act of yielding or giving up; habitual submission to the will of God; submission; patience.—SYN. of 'resign': to surrender; abdicate; relinquish; submit; leave; quit; forsake; forego; renounce; abandon;—of 'resignation': endurance; patience; fortitude; acquiescence; surrender; submission; relinquishment; renunciation; abdication; abandonment.

RESILE, v. *rĕ-zīl′* [F. *résilier*, to cancel—from L. *resilīrĕ*, to leap or spring back—from *re*, back; *salĭō*, I leap or spring]: to start back; to cancel; to withdraw from, as an agreement. RESIL′ING, imp. RESILED′, pp. *-zīld′*. RESILIENT, a. *rē-zĭl′ĭ-ĕnt*, leaping or starting back; rebounding. RESIL′IENCE, *-ĕns*, the act of springing back or rebounding; also RESIL′IENCY, n. *-ĕn-sĭ*.

RĒSIN, n. *rĕz′ĭn* [F. *résine*, rosin—from L. *rēsīna*; Gr. *rhētinē*, resin: It. *resina*]: brittle substance which exudes from many trees, especially from firs and pines, usually of yellowish or amber color, more or less transparent; the commonest *resin*, forming the remains of the still after distilling turpentine, is usually called *rosin* (see RESINS). RESINATE, n. *rĕz′ĭn-āt*, general name for the salts of the acids obtained from turpentine—viz., the sylvates, the pinates, and the pimarates. Their general formulæ are $C_{20}H_{29}MO_2$ and $C_{40}H_{55}MO_4$. RES′INY, a. *-ĭ*, partaking of the qualities of resin. RES′INOUS, a. *-ŭs*, containing or yielding resin; possessing the properties of resin. RES′INOUSLY, ad. *-lĭ*. RES′INOUSNESS, n. *-nĕs*, the quality of being resinous. MINERAL RESINS, pitchy or resinous substances, as asphalt, amber, retinite, etc. RESINOUS ELECTRICITY, electricity which is excited by rubbing bodies of the resinous kind—called also *negative*, and opposed to *vitreous* or *positive electricity*. RES′INO-ELEC′TRIC, a. exhibiting negative electricity. RES′INIF′EROUS, a. *-ĭf′ĕr-ŭs* [L. *fero*, I produce]: producing resin. RES′INIFORM, a. *-ĭ-fawrm* [L. *forma*, shape]: having the form of resin.

RESINA, *rā-sē′nâ*: town of s. Italy, province of Naples, at the foot of Vesuvius, and facing the sea. R. is built on the site of ancient Herculaneum. Exquisite fruits are grown, and the famous *Lacrimæ Christi* wine is made in the vicinity. It is surrounded by country houses, and is a place of recreation for the Neapolitans, on account of its salubrity. The ascent of Mount Vesuvius is begun at R.—Pop. 13,626.

RESINITE, n. *rĕz′ĭn-īt*: see RETINITE.

RES′INS: class of natural vegetable products composed of carbon, hydrogen, and oxygen. They are closely allied to the essential oils, all of which, when exposed to the air, absorb oxygen, and finally become converted into substances having the characters of resin; and in most cases they are obtained from the plants which yield them, mixed with and dissolved in a corresponding essential oil. Like the natural oils, the natural resins are usually mixtures of two or more distinct resins, which admit of separation by their unequal solubility in different fluids.

The following are the general characters of this class of compounds. At ordinary temperatures, they are solid, translucent, and mostly colored, though some are colorless and transparent. Some are devoid of odor, while others give an aromatic fragrance from the admixture of an essential oil. In their crude state, they

never crystallize, but are amorphous and brittle, breaking with a conchoidal fracture; when pure, several of them may be obtained in crystalline form. They are readily melted by heat, and are inflammable, burning with white, smoky flame. They are usually described as non-volatile, but it has been shown that common resin may be distilled in a current of superheated steam. They are insoluble in water; but dissolve in alcohol, ether, and the essential and fixed oils. They are insulators or non-conductors of electricity, and become negatively electric by friction. Many possess acid properties, in which case their alcoholic solutions redden litmus. These R. combine with the alkalies, and form frothy soap-like solutions in alkaline lyes. The resinous soaps thus formed differ from ordinary soap in not being precipitated by chloride of sodium.

The R. are divisible into the *hard resins*, the *soft resins*, and the *gum resins*.—The hard R. are at ordinary temperatures solid and brittle; they are easily pulverized, and contain little or no essential oil. Under this head are included copal, the varieties of lac, mastic, and sandarac, and the R. of benzoin commonly called gum benzoin, jalap, guaiacum, etc.—The soft R. admit of being molded by the hand, and some are viscous and semi-fluid, and are termed *balsams*. They consist essentially of solutions of hard R. in essential oils, or admixtures of the two. They become oxidized and hardened by exposure to the air into the first class of R. Under this head are placed turpentine, storax, balsam of copaiba, and the balsams of Canada, Peru, and Tolu. —The gum R. are the milky juices of certain plants solidified by exposure to the air. They consist of a mixture of R. and essential oils with considerable proportion of gum; and on this account, when rubbed up with water, they yield a turbid or milky fluid from the dissolved gum, retaining the resin and oil in suspension, and are only partly soluble in alcohol. Some of them, e.g., ammoniacum, a-safetida, euphorbium, galbanum, gamboge, myrrh, olibanum, etc., are valuable medicinal agents; while others, e.g., caoutchouc (or India-rubber) and gutta-percha, are of great value in the arts and manufactures.

The R. are very widely diffused throughout the vegetable kingdom; but certain families of plants are especially rich in them. They are obtained usually by making incisions into the wood of the trees which produce them; but sometimes they exude spontaneously, and in other cases they must be extracted from the wood by boiling alcohol. The crude R. are separated from the essential oils with which they are usually mixed by distillation with water, the resin remaining while the oil and water pass off; and from the gummy and mucilaginous matters by alcohol, which dissolves out the pure R., which can be precipitated from their alcoholic solution by addition of water. The R. are extensively used in medicine; and in addition to the almost innumerable applications

of caoutchouc and gutta-percha, various R. are of service in preparation of varnishes, soaps, pigments, artificial light (resin-gas), etc.

Various fossil R. are known, of which the most important is amber. Some chemists place bitumen and asphalt among this class; and among the fossil R. described by mineralogists are Fichtelite, Hartite, Idrialite, Ozocerite, Scheererite, Xyloretin, etc.

The common resin, or rosin, of commerce exudes in semi-fluid state from several species of pine, especially *Pinus tæda*, *P. mitis*, *P. palustris*, and *P. rigida* of N. America, *P. pinaster*, *P. pinea*, and *P. Laricio* of s. Europe, and *P. sylvestris* of n. Europe. The process of collecting it is simple: a longitudinal slice of the bark and wood

Fig. 1.

Fig. 2.

(A, fig. 1), about a ft. in length, is taken off by means of an ax with a curved blade (fig. 2); and at the bottom of the groove thus made, a small piece of bent wood or thin metal, as tin or zinc, is driven into a curved cut, made by one blow of the ax (B, fig. 1); this forms a sort of spout, which catches the liquid resin as it runs from the wound, and guides it into a small pot, made of common clay burned. At certain periods, these pots are emptied, and their contents put into casks, for transport to the distilleries, where the volatile essential oil is removed from the resin. The resin thus procured is much used in manufacture of common yellow soap, also for sizing paper and various other purposes, including preparation of ointments and plasters in pharmacy.

The other R. most generally known and used in America and Europe are Anime (q.v.), Copal (q.v.), Dammar (q.v.), Mastic (q.v.), Sandarac (q.v.), Frankincense (q.v.), Lac (q.v.). In addition, many are of essential service in other countries; as the Piney Resin or Dhoop, from *Vateria indica*; Black Dammar, from *Canarium strictum*; Saul Resin, or Dammar Batu, from *Shorea*

robusta—all serving many useful purposes in India, China, Japan, and other Asiatic countries. The forests of S. America furnish many others.

RESIST, v. *rē-zĭst'* [F. *résister*—from L. *resistĕrĕ*, to resist, to oppose—from *re*, back or again; *sisto*, I stand: It. *resistere*]: to act in opposition to; to strive or act against; to withstand; to make opposition: N. a sort of paste or mixture to preserve portions of white color in print-dyeing. RESIST'ING, imp. RESIST'ED, pp. RESIST'ER, n. *-ĕr*, one who resists. RESIST'IBLE, a. *-ĭ-bl*, that may be resisted. RESIST'IBLY, ad. *-blĭ*. RESIST'IBLENESS, n. *-bl-nĕs*, or RESIST'IBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of being resistible. RESIST'ANCE, n. *-ăns* [F.—L.]: opposition; hindrance; quality of not yielding to force; the powers by which motion in a body is diminished or destroyed. RESIST'ANT, a. *-ănt* [F.—L.]: making resistance: N. one who or that which resists. RESIST'LESS, a. *-lĭs*, that cannot be effectually opposed or resisted. RESIST'LESSLY, ad. *-lĭ*. RESIST'LESSNESS, n. *-nĕs*, the state of being resistless.—SYN. of 'resist': to oppose; withstand; thwart; hinder; check; baffle; disappoint.

RESIST'ANCE OF FLU'IDS: see HYDROSTATICS: ATMOSPHERE.

RES JUDICATA, *rēz jū-dĭ-kā'tâ*, in Law: the subject-matter of an action already decided by a court of competent jurisdiction: in such a case, a plea setting up the *res judicata* is sufficient defense; but the suit in the former case must have been between the same parties.

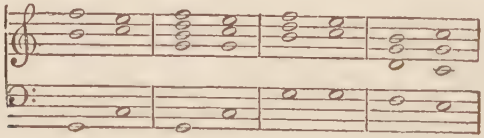
RESOLU'BLE, a. *rĕz'ō-lō-bl* [*re*, back or again, and *soluble*: F. *résoluble*—from mid. L. *resolu'bĭlis*, resolvable—from L. *resolvĕrĕ*, to resolve (see RESOLVE)]: that may be melted or dissolved.

RESOLUTE, a. *rĕz'ō-lūt* [Sp. *resoluto*; It. *risoluto*; F. *résolu*, resolute, bold—from L. *re*, back; *solūtus*, loosed; *solvĕrĕ*, to loose]: determined; decided; characterized by firmness and constancy in pursuing a purpose; undaunted: N. in *OE.*, a determined person; one determinedly bent on a purpose. RES'OLUTELY, ad. *-lĭ*, firmly; constantly; steadily. RES'OLUTENESS, n. *-nĕs*, the quality of being resolute in a fixed purpose; unshaken firmness.—SYN. of 'resolute': determined; decided; steady; steadfast; fixed; firm; bold; unshaken; persevering; constant.

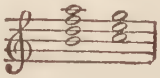
RESOLUTION, n. *rĕz'ō-lū'shŭn* [F. *résolution*—from mid. L. *resolutiōnem* (see RESOLUTE)]: fixed determination; steadiness or fixedness of purpose; constancy in execution; firmness; a formal proposition brought before a public body for discussion and adoption. RESOLU'TIONER, n. *-ĕr*, one who joins in the declaration of others; one of a party of the Church of Scotland in the 17th c.—SYN. of 'resolution': decision; firmness; resolvedness; fortitude; steadfastness; purpose; resolve; perseverance; boldness.

RESOLUTION, n. *rĕz'ō-lō'shŭn* [L. *resōlūtus*, enervated, relaxed—from *re*, back; *sōlūtus*, loosed; *solvĕrĕ*, to loose]: the act or process of disentangling or overcoming difficulties; the process of separating the component parts of bodies; analysis; in *med.*, the dispersion or disappearance of a tumor or inflammatory part; in *math.*, solution; in *dyn.*, the estimation of the various forces acting together at one point; a term frequently used as the opposite of COMPOSITION—as, *the resolution and composition of forces* (see COMPOSITION): in *music* (see below). *Note.*—The two preceding titles are identical in their etymology. RESOLUTION, 'fixed determination,' signifies primarily, 'the state of being let loose or free from restraint.'—SYN.: separation; analysis; dissolution; disentanglement.

RESOLU'TION, in Music: the passing from a discord into a concord; descent by a tone or a semitone of the discord heard in the preceding harmony, as the mode requires. In the progression of chords in a musical composition, there are certain chords that require to be followed by certain others, or, as it is called, *resolved* into them; otherwise, a sense of incompleteness is left on the ear. Thus the chord of the dominant seventh must be resolved by the tonic harmony, the major third ascending a semitone to the key-note, and the seventh descending one degree to the third of the key:



The diminished triad is similarly resolved, and all chords immediately derived from the dominant harmony. The chord of the added ninth is resolved by descending a second to the fifth of the tonic:



RESOLVE, v. *rē-zŏlv'* [L. *resolvĕrĕ*, to separate, to unfasten—from *re*, back; *solvo*, I loose: It. *risolvere*]: to reduce to simple parts or first principles; to analyze; to clear of difficulties; to explain; to determine in one's own mind; to fix in a determination; to decide; to purpose; to constitute by vote or formal declaration; in *med.*, to disperse or scatter, as a tumor; in *OE.*, to inform; to free from difficulty or doubt; to settle in an opinion: N. fixed purpose of mind; determination. RESOLV'ING, imp. RESOLVED', pp. *-zŏlvd'*: ADJ. fixed or determined in purpose. RESOLV'ER, n. *-ĕr*, one who resolves. RESOLV'ABLE, a. *-ă-bl*, capable of being resolved; that may be reduced to first principles. RESOLV'ABIL'ITY, n. *-bil'ĭ-tĭ*, capability of being resolved. RESOLV'EDLY, ad. *-ĕd-lĭ*. RESOLV'EDNESS, *-nĕs*, fixedness of purpose; firmness. RESOLV'ENT, a. *-ĕnt*, in *med.*, having the power to dissolve or scatter, as a tumor: N. a medicine which dissolves a tumor. TO RESOLVE A NEBULA, in *astron.*, to cause a nebula by a powerful instrument to appear separated into distinct stars.—SYN. of 'resolve, v.': to analyze; explain; solve; disentangle; unravel; conclude; purpose; decide; determine; fix; confirm; melt; dissolve; disperse; reduce; constitute; form; decree.

RESONANT, a. *rĕz'ō-nănt* [F. *résonnant*, resounding—from L. *rĕsōnans* or *rĕsōnan'tem*, resounding or re-echoing—from *re*, back; *sono*, I sound: It. *risonante*, resounding]: returning sound; echoing back. RES'ONANTLY, ad. *-lĭ*. RES'ONANCE, n. *-năns*, the returning or prolongation of sound, as by the air acting on the bodies of stringed instruments. RESONATOR, n. *rĕz'ō-nāt-ĕr*, instrument invented by Helmholz for facilitating analysis of compound sounds. When fitted to one ear, the other being stopped, tones above or below the pitch of the resonator will be imperfectly heard: but a note corresponding to the peculiar note of the resonator will be intensified.

RESORCIN, *rĕz-awr'sĭn* [*resin*, and *orcin*: crystalline chemical compound, formulæ $C_6H_6O_2$ or $C_6H_4(OH)_2$. It is homologous with orcin, $C_7H_8O_2$, hence its name. R. is produced by the action of potassium hydrate on various resins, especially ammoniacum, and also synthetically. It is in triclinic crystals, colorless, but becoming pinkish on exposure to air, very soluble in water. R. is a valuable antiseptic: irritant only in strong solutions applied to mucous membranes or abrasions.

RESORT, v. *rē-zŏrt'* [F. *ressortir*, to go forth again—from *re*, again; *sortir*, to go out: mid. L. *resortīrĕ*, to be subject to a tribunal, to appeal—from L. *re*, again; *sors* or *sortem*, a lot: also referred to L. *re*, again; *surgĕrĕ*, to rise]: to repair; to apply; to betake one's self; to have recourse; to frequent; in *OE.*, to fall back: N. act of resorting; a place much frequented; concourse. RESORT'ING, imp. RESORT'ED, pp. RESORT'ER, n. *-ĕr*, one who resorts. LAST RESORT, final tribunal; that from which there is no appeal; final means.

RESOUND, v. *rē-sownd'* [*re*, again, and *sound*]: to sound again.

RESOUND, v. *rĕ-zownd'* [L. *resŏnārĕ*, to resound—from *re*, back or again; *sonārĕ*, to sound: It. *risonare*: F. *résonner*]: to send back sound; to echo; to reverberate; to praise or celebrate by the sound of the voice or an instrument; to spread the fame of; to be sent back, as sound; to be much and loudly praised: N. the return of sound; an echo. RESOUND'ING, imp.: N. the act of sounding back. RESOUND'ED, pp.

RESOURCE, n. *rĕ-sōrs'* [F. *ressource*, resource—from L. *re*, again; *surgĕrĕ*, to rise (see SOURCE)]: any source of aid or support; any person or object which may be resorted to for assistance, safety, or supply; an expedient; a contrivance. RESOURC'ES, n. plu. *-ĕz*, available means; property; funds. RESOURCE'LESS, a. *-lĕs*, destitute of resources.—SYN. of 'resource': expedient; device; contrivance; means; resort.

RESOW, v. *rē-sō'* [*re*, again, and *sow*]: to sow anew.

RESPECT, v. *rĕ-spĕkt'* [F. *respecter*, to respect—from L. *respectārĕ*, to look back, to respect; *respectus*, respect, regard—from *re*, back or again; *specto*, *speciō*, I look at, I behold: It. *rispettare*]: to regard; to view or consider with some degree of reverence; to esteem for worth or superiority; to have relation to: N. that estimation or honor in which men hold the worth or good qualities of others; deference; partial regard; undue bias; in *Scrip.*, good-will or favor; in *OE.*, regard; attention; reverend character; consideration; motive. RESPECTS', n. plu. *-spĕkts'*, deferential good wishes; complimentary regards. RESPECT'ING, imp. RESPECT'ED, pp. RESPECT'ER, n. *-ĕr*, one who respects. RESPECTING, prep. *rĕ-spĕkt'ĭng*, with relation or regard to; regarding. RESPECT'LESS, a. *-lĕs*, having no respect; without regard. RESPECT'ABLE, a. *-ă-bl* [F.—L.]: deserving respect; worthy of esteem and honor; moderately excellent; not mean; ordinary. RESPECT'ABLY, ad. *-blĭ*. RESPECTABIL'ITY, n. *-bĭl'ĭ-tĭ*, the state of being respectable; the qualities in character which deserve or command respect. RESPECTFUL, a. *-fûl*, marked by outward civility; deferential; courteous; civil. RESPECT'FULLY, ad. *-lĭ*. RESPECTFUL'NĔSS, n. *-nĕs*, the quality of being respectful. RESPECTIVE, a. *rĕ-spĕkt'ĭv*, having relation to a particular person or thing; not absolute; belonging to each, as their *respective* abodes; in *OE.*, worthy of reverence. RESPECTING, or RESPECT'ANT, in *her.*, position of two animals borne face to face; but beasts of prey rampant when so borne are said to be *rampant combatant*. RESPECT'IVELY, ad. *-lĭ*, as each belongs to each; particularly; relatively; not absolutely; in *OE.*, partially; with great reverence. IN RESPECT OF, or IN RESPECT TO, in relation to; with regard to.—SYN. of 'respect, v.': to esteem; honor; revere; venerate; regard;—of 'respect, n.': consideration; estimation; deference; attention; regard

RESPIRATION: act of inhalation and exhalation. Its object, its organs, and its process, are here to be considered.—The two great objects of respiration or breathing are: first, introduction into the system of oxygen, by which the products resulting from the disintegration or breaking up of the muscular, nervous, and other tissues of the body are converted into compounds easily eliminated or removed by the excreting organs (as the kidneys, lungs, skin, etc.); and, secondly, removal of the most noxious and, consequently, the most important of these products, carbonic acid, through special respiratory organs, which, in most air-breathing animals, except insects, are lungs; while in water-breathing animals, excepting those very low in the scale of organization, they take the form of *branchiæ* or gills. In all the vertebrated animals, excepting in fishes, and in the amphibians during their young state, the respiratory organs are more or less complicated internal air-sacs, communicating through the throat with the external atmosphere. A few of the amphibians, such as the species of the genera *Proteus* and *Siren*, retain their branchiæ during their whole life; hence they are placed in the order *Amphipneusta*, a term indicating their double mode of breathing. The simplest known form in which the LUNGS or internal air-sacs exist is as a pair of elastic membranous bags close beneath the vertebral column, communicating with the surrounding atmosphere by a tube known as the windpipe, or *trachea*, which opens through the larynx, or organ of voice, into the throat. These bags are lined by a delicate, thin, and moist membrane, called a mucous membrane, embedded in and partly beneath which is a vascular network, through which all the blood in the animal's body is in turn driven by the heart. The moist partition between the blood in this network and the air in the interior of the lungs is so thin, that after having (by its moisture) dissolved the oxygen of the air, it permits of its passage into the moving current of blood, while through the same agencies carbonic acid simultaneously passes in an opposite direction from the blood into the air. To complete the apparatus, there are certain muscles under whose action the bags are emptied of their vitiated contents, and refilled with pure air. Such are the respiratory organs as they occur in that remarkable animal, the *Proteus anguinus*, found in the dark caves of Carinthia, and belonging to the order *Amphipneusta*, referred to above. In the more highly organized animals and in man, we find these elementary essential parts complicated and modified in great variety of ways. Confining our present view to the respiratory process in man and mammals, we may consider two anatomical details under three different heads. *First*, There must be a special respiratory organ—the lungs—affording by its internal arrangement an immense extent of internal surface, covered by vascular network, through which the blood flows in innumerable minute streamlets,

separated by only an extremely thin membrane from the atmospheric air that has been inhaled; *secondly*, There must be such an arrangement of the circulating system that fresh blood may be perpetually driven from the right side of the heart through the lungs, and onward to the left side of the heart; *thirdly*, There must be arrangements for the frequent and regular change of the air contained in the lungs. These three points will be considered in the above order.

A sufficiently large internal aërating surface might of course be obtained by increasing the size of the air-bags themselves, but this would involve an increase of size in the animal. In examining the lungs of different animals, two plans are observed for increasing the internal surface without increasing the total bulk of the lungs. According to one plan, the internal surface is, as it were, molded into cells, separated laterally by partitions, somewhat like the cells seen in a section of honeycomb, or more like the appearance presented by the second or honeycomb stomach of ruminating animals; according to the other plan enormous multitudes of little lung-sacs partitioned, as will be presently shown, in their interior, are clustered round the ultimate branch of a common air-tube, which communicates with all of them. If we can conceive a bunch of grapes with its stem and all its minute branches, and the grapes attached to the ends of these branches completely hollow, we get a good idea of this second plan, except so far as the partitioning of the terminal cells (the grapes in the illustration) is concerned. By the former method, which occurs in amphibians and reptiles, the lung-sacs are merely rendered more cellular in their interior; while, by the latter plan, compound lungs are formed, as in birds, and in mammals, including man. Hence these two varieties of lung-structure correspond to the so-called cold-blooded and warm-blooded animals respectively. In fig. 1, representing a section of the lungs of the frog (magnified), and in fig. 5 under REPTILES, representing a section of the lungs of a turtle (diminished), we have illustrations of the first plan (the cellular lung-sac); while in figs. 2 and 3 we have diagrammatic illustrations of the human lung. Fig. 2 is a shaded diagram (copied from Marshall's series of *Physiological Diagrams*), to show the ramifications of the air-tubes in the human lungs. L is an outline representing the left lung; T. the main air-tube—called the windpipe or *trachea* (so called from the Greek word *tracheia*, rough, and similarly termed in Latin the *Arteria aspera*, though not an artery as we now employ the word)—descends through the neck from the larynx or organ of voice into the chest; B shows the

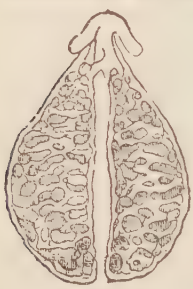


Fig 1.

right and left *bronchi*, or primary divisions into which the windpipe separates, one for each lung. Each bronchus enters the lung at the so-called root, and divides and subdivides into smaller branches, which never coalesce, but continue separate, like the branches and twigs of a tree. These are the *bronchial tubes* or the

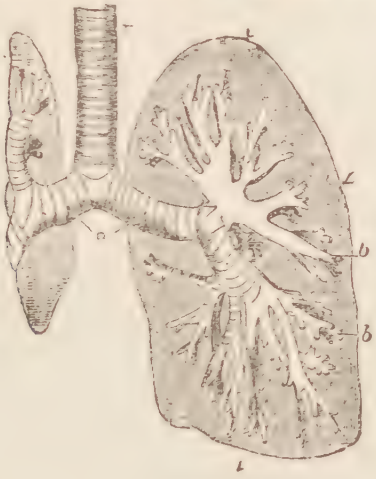


Fig. 2.

bronchiæ of some writers; the smallest shown in this diagram, *b*, *b*, undergo many further subdivisions, until (using Marshall's description) 'at length they form an immense number of minute tubes, not more than $\frac{1}{70}$ of an inch in diameter, each of which ends in a cluster of cells, or, as it may otherwise be described, opens into a small membranous sac, a little wider than itself, having a cellular internal surface very similar to that of the frog's lung, but of course on a microscopic scale.' In fig. 3 (also from Marshall's diagrams), there is a representation, magnified about 100 diameters, of three of these clusters of cells, or little lung-sacs, from the human lung. In this figure, *b* is a small air-tube, or bronchial tube, from which several of the finest or ultimate tubes proceed; *c* shows the outer surface of one of the lung-sacs, or *lobules* as they are commonly termed; *d*, the

Fig. 3.

Inner surface of another, which has been cut open to show the ultimate recesses of the lung to which the air has access—viz., the *air-cells*. According to Rossignol, the ultimate bronchial ramifications terminate in a shape resembling that of an inverted funnel, and hence he applies the term, *infundibula* to these endings. In fig. 4 (from Rossignol's *Mémoir*), there is a representation of the termination of an ultimate bronchial tube in the lung of a dog: *a* represents an ultimate tube, or lobular passage, branching toward the infundibula; *b* is the interior of one of the seven infundibula shown in the figure; while *c* represents one of the numerous septa or partitions projecting inward on the infundibular wall, and forming the air-cells. According to Todd and Bowman, the diameter of the lobular passages is from $\frac{1}{100}$ to $\frac{1}{250}$ of an inch, while that of the cells ranges from $\frac{1}{200}$ to $\frac{1}{300}$ of an inch. It is on the inner surface of these air-cells that the network of minute capillaries is spread in which the act of aëration takes place. Each lobule receives air through its own bronchial tube alone, and consequently there is no direct communication between the air-cells of adjacent lobules. These lobules are closely compressed on one another; and collectively, together with the connective tissue which unites them to one another, make up the great mass of the lungs. To such an extent is the process of subdivision carried out, that, according to calculation, the lungs of an adult man contain at least 600 millions of these air-cells. It is because of the air included in these cells that the pulmonary tissue has a soft spongy feel, and crackles when compressed between the fingers; and for the same reason, the lungs, and even small portions of them, even after strong pressure, float in water, it being extremely difficult to drive all the air out of the cells. The lungs (except in the fœtal state, when no air enters them) are thus the lightest organs, in relation to their size, in the body. Although their bulk is so great that, with the heart, they occupy almost the whole cavity of the chest, they weigh only about three lbs. and a half in men, and two lbs. and three-quarters in women. Their color varies at different ages: at birth, they are of pinkish white tint; in adult life, of slate color, with mottled appearance; and in old age, they become of still darker tint. The polygonal markings seen on the surface correspond to the outer surface of the lobules above noticed. Their shape is adapted to that of the cavity in which they are lodged, each lung being conical in form, with its apex rising into the neck; while its base, broad and concave, rests on the convex surface of the diaphragm; and between the two lungs lie the heart and the great vessels that proceed from it. During life (except in certain diseases,

Fig. 4.

e.g., PERICARDITIS, q.v.), the inner margins of the lungs nearly overlap the heart, leaving only a roundish space, less than two inches in diameter, of that organ uncovered, while their lower borders extend to the cartilages of the ribs, and fit into the angle formed between those cartilages and the diaphragm. Each lung is invested by its own serous membrane, the PLEURA (q.v.), which serves the double purpose of facilitating the movements which the lungs undergo in the act of respiration, and of suspending each lung in its proper position. In the latter function, the pleurae are essentially assisted by the great air-tubes and blood-vessels, which collectively form what are termed the roots of the lungs.

The structure of the air-tubes and the lungs themselves next requires consideration. Beginning with the upper portion, we have to consider the *trachea*, or windpipe, which in the human subject descends in the middle line from the **Larynx** (q.v.) to the level of the third dorsal vertebra, where it divides into the right and left bronchi (fig. 2). It is kept permanently open by 16 to 20 cartilaginous rings, which surround two-thirds of the tube, and are incomplete behind, where the tube is completed by the same fibrous membrane which covers and unites the cartilages in front and on the sides. In this fibrous membrane are numerous tracheal glands (which probably furnish much of the vapor of the breath, and may occasion its odor), together with unstriped muscular fibre, to which the term *trachealis* muscle has been given. The trachea measures about 4½ inches in length, and is about three-quarters of an inch wide. Its mucous membrane is continuous through the glottis with that of the pharynx or throat, and is covered with ciliated columnar Epithelium (q.v.). Of the bronchi, the right is wider, shorter, and more horizontal than the left. Their walls are composed on the same plan as those of the trachea. Upon entering the lung, each bronchus divides as above described. The walls of these bronchial tubes become thinner as they approach the air-cells. The cartilaginous portions which, in the primary divisions of each bronchus, partially retained the annular form, become gradually reduced to mere flakes, and finally cease in tubes of $\frac{1}{8}$ or $\frac{1}{10}$ of an inch in diameter. The unstriped muscular fibres occurring in the trachea are continued downward to the minutest tubes, forming a very thin layer, completely surrounding the canal, and the ciliated epithelium extends equally far. The terminal bronchial tube loses its epithelium and muscular coat at about $\frac{1}{8}$ of an inch from the most distant air-cell to which it leads, and is thus reduced to a single coat, consisting of the basement membrane (see MUCOUS MEMBRANES), with yellow elastic

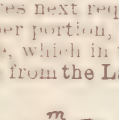


Fig. 5.—A separated Tracheal Ring.

r representing the cartilaginous, and *m* the posterior flattened membranous portion.

fibres blended with it. Of this structure, the interlobular passages and the air-cells are composed.

The mode in which the blood is perpetually changed in the lungs next demands consideration. The venous or impure blood collected from all parts of the body in the right side of the heart, is conveyed to the lungs by the pulmonary artery, which is about the size of the aorta, and, like that vessel, is furnished with three semilunar valves at its origin, which prevent the blood from regurgitating into the right ventricle of the heart (see CIRCULATION). The pulmonary artery divides, before entering the lungs, into a right and a left branch, which ramify as far as the lobules in company with the bronchial tubes. At this point, they distribute themselves on the outside of the lobules, in the so-called *interlobular fissures*, and penetrating between the air-cells, form a capillary network on and in the walls of the cells and of the lobular passages. This network empties its blood, which is now aërated, into minute venous radicles, which converge to form larger veins, and these finally form the four pulmonary veins, which discharge their arterialized blood into the left side of the heart. The walls which support the capillary network of the lungs are (as Todd and Bowman observe) 'for the most part much too thin to enclose the capillaries between the two layers of their substance, and therefore the capillaries project fairly into the air cells by a great part of their circumference, being adherent to the wall by a narrow line only. The capillary wall is thus exposed and bare, in contact with the air of the cell, and nothing besides the delicate membrane of the capillary intervenes between the air and the blood. A capillary frequently passes through an aperture in the cell-wall, so as first to project into one cell, and further on into a contiguous one, but never becomes altogether free from the wall.'—*Phys. Anat.* II. 393. The diameter of these capillaries is about $\frac{1}{1800}$ of an inch, which is comparatively large, and admits of the passage of blood freely; and the air and the blood may be said to be in contact, since they are separated by only a delicate capillary wall, less than $\frac{1}{20000}$ of an inch in thickness. If the rate of the blood in the capillaries be taken at an inch and three-quarters per minute (according to the estimate of Valentin, drawn from observation of the frog's foot), it has been calculated that the blood would at each circuit remain in contact with the air about one second and a half. Probably, however, the motion of the blood is quicker in the pulmonary capillaries of man and other mammals and of birds than in those of the frog's foot.

In addition to the pulmonary artery and pulmonary veins, which convey the blood to and from the lungs for the purpose of aëration, there are other vessels, known as the bronchial vessels, for the nutrition of the lung itself, the distribution of which, and their mode of communication with the pulmonary vessels above described, have been subjects of much discussion; but into this we

need not enter. The lungs are supplied with nerves from the anterior and posterior pulmonary plexuses, lying at the root of the organ, and composed of filaments of the pneumogastric and sympathetic nerves. The filaments from these plexuses accompany the bronchial tubes, in which they are finally lost. The part which these nerves act in the respiratory process will be considered after a description of the *movements of respiration*, by which the air in the lungs is being perpetually changed.

Fig. 6.

Diagrams (by Hutchinson) showing the extent of antero-posterior movement in ordinary and in forced respiration in male and female. The back is supposed to be fixed, in order to throw forward the movement as much as possible. The black line indicates, by its two margins, the limits of *ordinary inspiration* and *expiration*. In *forced inspiration*, the body comes up to the dotted line, while in *forced expiration* it recedes to the smallest space indicated.

For description of the shape and framework of the chest, see CHEST. The chest (or thorax, as it is termed by anatomists) is so constructed as to be capable of enlargement in height (vertically), in depth (or from the front backward), and in width (or from side to side). Its height is increased mainly by the descent of the diaphragm, and to a certain extent by the elevation of the ribs, and the widening of the intercostal spaces; while its depth and width are increased by the elevation of the ribs, which carry forward and elevate the breast-bone (or sternum), especially at its lowest end, and are slightly rotated on an imaginary axis, joining their ex-

tremities, by which their central portion is raised, and slightly removed from the mesial plane of the chest. It is only in forced or deep inspiration that all these means of enlarging the chest are called into play. An ordinary inspiration is attended in men with very slight elevation of the ribs (about one-twentieth of an inch), while in women the elevation is much greater, especially in the upper ribs; the cause of this difference in the sexes probably lying in the narrower waist of the female requiring a compensation in the upper part of the chest. Beau and Maissiat describe three varieties of ordinary R.: 1. Abdominal, or that effected chiefly by the diaphragm, and seen in the motion of the walls of the belly; 2. Costo-inferior, or that in which the seven lower ribs are observed to act; 3. Costo-superior, or that effected in considerable degree by the upper ribs. The first variety occurs in infants till the end of the third year, and in males generally; the second in boys after the age of three, and in men; and the third in adult females. The difference between the depth of a forced and an ordinary inspiration is shown in the accompanying figures. The total power of the various respiratory muscles has been measured by several physiologists, among whom Dr. Hutchinson deserves special notice. He finds, as the average of 1,500 experiments, that the power of expiration is nearly one-third stronger than that of inspiration; and he is of opinion that when the expiratory are not stronger than the inspiratory muscles, some disease is present. He tested the force of the two classes of respiratory muscles by causing persons to make the most powerful efforts of which they were capable, when breathing through the nose into an instrument termed a spirometer; and by this means he found that men of five ft. seven or eight inches in height have the greatest inspiratory power, it being equal, on an average, to a column of mercury of 2·75 inches, while their expiratory power was equal to 3·97 inches. The following table is given by him as exhibiting the range through which these powers may vary within the limits of health:

Power of Inspiration.		Power of Expiration.
1·5 inches	Weak	2·0 inches
2·0 "	Ordinary	2·5 "
4·5 "	Remarkable	5·8 "
7·0 "	Very extraordinary	10·0 "

The co-operation of the resilience of the lungs and the elasticity of the walls of the chest with the expiratory muscular movement, is probably the cause why the expiratory power, as tested by the height of a column of mercury, is greater than the inspiratory power. Dr. Hutchinson calculates that a man who raises three inches of mercury by an effort of inspiration exerts a force equal to 1,000 lbs.; while the one remarkable case

in which the mercury rose to seven inches, indicated a force of 2,200 lbs., or nearly two tons.

The following points in connection with the respiratory movements require notice. Every complete act of R. is divisible into four parts—1. Inspiration; 2. A short pause, not always observed; 3. Expiration; 4. A considerable pause, occupying, according to Vierordt, about one-fifth of the whole time required for one complete respiratory act. The act of expiration is always more prolonged than that of inspiration, the former being to the latter in the ratio of 12 : 10 in adult males; and as 14 : 10 in children, women, and aged persons. The number of respiratory acts performed in a minute varies at different ages. According to Quetelet, at birth there are 44 respirations in one minute; at 5 years of age, 26, from 15 to 20 years 20; from 20 to 25 years 18·7; from 25 to 30 years 16; from 30 to 50 years 18·1: so that from 16 to 20 may be taken as the ordinary range for healthy adults, though Hutchinson gives the wide range of 6 to 40. The average ratio which the number of respirations bears to the number of pulsations in a given time is about 1 : 4½, and if there is any great deviation from this ratio, there is probably some obstruction to the aëration of the blood, or some disorder of the nervous system. Thus, in pneumonia (or inflammation of the lungs), in which a greater or less amount of pulmonary tissue is unfitted for its office, the number of the respirations increases in a more rapid proportion than the number of pulsations, so that the ratio becomes as 1 : 3, or even as 1 : 2. In hysteria, a similar or even greater deviation from the normal ratio may occur; and Elliotson records a case in which the respiratory movements were 98, or even 106, whilst the pulse was 104. On the other hand, in certain typhoid conditions, and in narcotic poisoning, the respiratory acts are diminished in number; the ratio of respirations to pulsations being as 1 : 6, or even 1 : 8.

We have next to inquire into the mode in which the muscular movements of R. are kept up by nervous power. 'There can be no doubt,' says Dr. Carpenter, 'that these movements, though partly under the control of the will, are essentially "automatic" in their nature. Their chief centres consist of two ganglia; corresponding to the origins of the pneumogastric nerves, which are the principal excitor nerves which convey the stimulus on which these movements are dependent; while from the adjacent parts of the medulla oblongata and spinalis proceed the chief motor nerves by which they are carried into effect. And thus it happens that the whole of the encephalon may be removed from above, and the spinal cord (as far up as the origin of the phrenic nerve) from below, without suspending the most essential of the respiratory movements.'—*Principles of Human Physiology* (6th edit., 1864, p. 274). It would carry us far beyond our assigned limits to notice the interesting series of phenomena that follow

the division or irritation of the various branches of the pneumogastric nerve; but it may be noted that when the trunks of this nerve are divided on both sides, the respiratory movements still go on, though with diminished activity. Hence, there must be other excitors to the action of the respiratory muscles. Among these, the nerves distributed to the general surface, particularly to the face, probably perform an important part; and in exciting the first inspiration, the fifth pair seem the principal agent. In support of this view, Dr. Carpenter adduces the well-known fact, that the first inspiratory effort of the new-born infant is most vigorously performed when the cool external air comes in contact with its face. Dr. Marshall Hall, in his *New Memoir on the True Spinal Marrow*, p. 29, relates a case in which the first inspiration was delayed simply because the face was protected from the atmosphere by the bedclothes; the instant they were lifted up, the infant breathed. Many familiar facts demonstrate the influence of the superficial nerves on the respiratory system in the adult as well as in the infant. 'Every one,' to use Dr. Carpenter's words, 'knows that the first plunge into cold water, or the first descent of the stream of the shower-bath, or even the dashing of a glass of cold water in the face, will produce inspiratory efforts; and this fact has many important practical applications. Thus, in the treatment of asphyxia, whether congenital or the result of narcotic poisoning, drowning, etc., the alternate application of cold and heat is found to be one of the most efficacious means of restoring the respiratory movements; and a paroxysm of hysterical laughter may be cut short by dashing a glass of cold water in the face.' The principal motor or efferent nerves concerned in bringing out the respiratory movements are the phrenic, going to the diaphragm; the intercostal, supplying the intercostal muscles; the facial and the spinal accessory nerves; though, as above mentioned, the superficial nerves generally exert a motor or efferent action.

How far the respiratory movements are under the influence of the will, has given rise to much discussion. That, in their ordinary mode of performance, they are independent of the will, is obvious from their systematic occurrence during sleep, in cases of paralysis in which the power of the will is lost, in apoplexy, etc. At the same time, universal experience teaches us that these movements are partly, but not entirely, under the control of the will. We can, with little inconvenience, suspend the respiratory actions for a minute or even longer if we have previously introduced into the lungs a full supply of fresh air; but if the suspension be further prolonged, the stimulus conveyed by the excitor nerves to the nervous centres becomes so strong, that by no effort of the will can we avoid making inspiratory efforts. It is asserted by Bourdon, eminent French physiologist, in *Recherches sur le Mécanisme de la Respiration*, that no person ever succeeded in committing suicide by simply holding

the breath, but that such persons have attained their object by holding the face under water, because here another set of muscles is called into play, which are much more under the control of the will than those of respiration. If we seek for the reason why, in man and the higher animals, the respiratory actions are placed under direction of the will, it may probably be found in the necessary physiological connection that exists between them and the production of those vocal sounds by which individuals (men or animals) can communicate their feelings and wishes to one another.

We complete the subject so far as human physiology is concerned, by noticing (1) the greatest quantity of air that can be expelled by a forcible expiration; (2) the total quantity that passes through the lungs in a given time; (3) the effects of R. on the air; and (4) the effects of suspension or deficiency of respiration.

When the lungs have been emptied as much as possible of air by the most powerful expiratory effort, they still contain a quantity over which we have no control, and which may be estimated at about 40 cubic inches though according to Hutchinson, as will be presently seen, this estimate is far too small. To this portion of the contents of the lungs the term *Residual Air* is applied. In addition to this residual air, physiologists distinguish, in connection with the respiratory process, *Supplemental Air*, which is that portion which remains in the chest after an ordinary gentle expiration, but which may be displaced at will; *Breathing* or *Tidal Air*, which is the volume displaced by the constant gentle inspiration and expiration; and *Complemental Air*, or the quantity which can be inhaled by the deepest possible inspiration, over and above that introduced in ordinary breathing. The greatest volume of air that can be expelled by the most powerful expiration, which is obviously the sum of the supplemental, breathing, and complemental air, is designated as the *Vital Capacity*—a term originally introduced by Dr. Hutchinson, inventor of the spirometer, who found, from nearly 5,000 observations, that of all the elements or factors which might be supposed to influence it, *height* alone stood in a definite and constant relation to it, this relation being expressed by the rule, that, 'for every inch of stature from 5 to 6 ft. 8 additional cubic inches of air (at 60° Fahr.) are given out by a forced expiration after a full inspiration.' Thus, the vital capacity for a man from 5 ft. to 5 ft. 1 inch being 174 cubic inches that for a man from 5 ft. 1 inch to 5 ft. 2 inches is 182 cubic inches; and so on. With regard to bodily weight as a factor, Dr. Hutchinson found, that 'when the man exceeds the average weight (at each height) by 7 per cent., the vital capacity decreases 1 cubic inch per lb. for the next 35 lbs. above this weight.' Age and muscular development do not influence the result so much as might have been expected. It has been frequently observed that the vital capacity is small in athletic men, and that it has been

in excess in persons in no way remarkable for physical power. The *maximum* vital capacity met with by Dr. Hutchinson was 464 cubic inches; this was in a man 7 ft. high, whose weight was 308 lbs.: the *minimum* was 46 cubic inches, in the case of a dwarf whose height was only 29 inches, and who weighed 40 lbs.

In estimating the effects of the respiratory process on the air which passes through the lungs, we adopt the data afforded by observations of Dr. Edward Smith, who has arranged a spirometer by which the quantity of air inspired may be registered from 1 to 100,000 cubic inches, and therefore for any period. This instrument, says Dr. Carpenter (to whom Dr. Smith has communicated many of the following statements for insertion in the new ed. of his *Human Physiology*), 'he has used for 24 hours without intermission, except for meals, and he has ascertained the quantity of air inspired during sleep and in almost every condition met with during the day. From numerous experiments upon several persons, each extending over a whole day, he found that the average depth of inspiration was 33·6 cubic inches when at rest; and when walking at 1, 2, 3, and 4 miles an hour, 52, 60, 75, and 91 cubic inches, and even 107 cubic inches when working the tread-mill. If we take 30 or 40 cubic inches as the average quantity exchanged at each R., we cannot but observe how small a proportion it bears to the entire amount which the lungs usually contain, for the "residual air" which cannot be expelled is estimated by Dr. Hutchinson at from 75 to 100 cubic inches; and the "supplemental air," which can only be expelled by a forced expiration, is about as much more; the sum of the two being from 150 to 200 cubic inches, or from 5 to 7 times the "breathing volume."' Now, it is obvious that if no provision existed for mingling the air inspired with the air already occupying the lungs, the former would penetrate no further than the larger air-passages, and, as this would be again thrown out at the next expiration, the bulk of the air contained in the lungs would remain altogether without renewal, and the expired air would not be found to have undergone any change. The law of the *Diffusion* (q.v.) *of Gases* here comes into action, for the air in the air-cells and finer tubes being charged by the respiratory process with a great excess of carbonic acid, as compared with the inspired air contained in the larger tubes, a diffusion of the carbonic acid necessarily takes place in the outward direction, while the oxygen from the air, or the air itself, similarly diffuses itself in an opposite direction, toward and into the air-cells themselves.

The *total amount* of air which passes through the lungs in 24 hours must obviously vary with the extent and frequency of the respiratory movements. Dr. Smith found that during the day (6 A.M. to 12 P.M.) the average quantity of air inspired by several persons at rest was 502 cubic inches per minute, or a total of 542,160 cubic inches; and as the average quantity during

the night was about 400 inches per minute, the total daily amount was 686,000 cubic inches. This quantity is largely increased by exertion, and Dr. Smith computes that the total amount actually respired by the unoccupied gentleman, the ordinary tradesman, and the hard working laborer, would be 804,780, 1,065,840, and 1,568,390 cubic inches respectively.

The *alterations* in the inspired air effected by R. consist essentially in the removal of a portion of the oxygen, and its replacement by a nearly corresponding bulk of carbonic acid. The amount of carbonic acid in the expired air varies inversely with the number of respirations; it reaches 5·5 per cent. (or more) when the respirations are only 6 in the minute, while it falls as low as about 2·6 per cent. when the respirations are 96 in the minute. About 4·35 per cent. of carbonic acid is, on an average, added to the air in ordinary R., while about 4·782 per cent. of oxygen is removed; the actual diminution of bulk of the expired air (after the removal of the moisture obtained from the lungs) being about $\frac{1}{25}$ of its volume. Hence, unless where there is free ventilation, the air in an apartment containing men or animals must soon become vitiated by containing a great excess of carbonic acid (for ordinary atmospheric air contains only about one part of carbonic acid in 2,500 parts), and a deficiency of oxygen. The absolute quantity of carbonic acid (consequently of carbon) exhaled in 24 hours is liable to great variations, caused by the temperature and moisture of the air, age, sex, muscular development, the nature and quantity of the food, muscular exercise, sleep, state of health, etc. Dr. Smith calculates that an adult man in a state of rest exhales in 24 hours an amount of carbonic acid equivalent to 7·144 oz. of carbon; and he estimates that it should be increased to 8·68 and 11·7 oz. for the non-laboring and laborious classes respectively, at their ordinary rate of exertion. We may add that the total amount of carbonic acid is greatly increased by external cold, and diminished by heat; that it is increased by a moist, and diminished by a dry atmosphere; that it increases in both sexes to about the 30th year, when it remains stationary for 15 years, after which it diminishes; that at all ages beyond 8 years it is greater in males than in females, and that it increases during pregnancy; that it is greater in robust than in slender men, the quantity of carbon expired *per diem* to each 1 lb. of bodily weight being (according to Smith) 17·07, 17·51, and 17·99 grains at 48, 39, and 33 years of age respectively; that it is greatly increased by eating (see MUSCLE—MUSCULAR TISSUE—*Muscular Force*), and is diminished by fasting; that it is increased by muscular exertion (Smith found that when walking three m. an hour he excreted 2·6 more carbonic acid than when at rest; while tread-wheel labor occasioned about double the excretion caused by walking); that it is diminished by sleep; and that it is increased

in the exanthematous fevers (measles, small-pox, scarlatina, etc.), and in chlorosis; while it is diminished in typhus and in chronic diseases of the respiratory organs.

There has been much discussion with regard to the extent to which the nitrogen of the air is affected by R. Usually a small amount of this gas is given off, but the quantities absorbed and exhaled so nearly balance each other, that its special action on the organism must be very slight, further than as being a diluter of the oxygen, which would be too stimulating if breathed in a pure state.—As to the watery vapor with which the exhaled air is saturated, the amount exhaled in 24 hours may range from about 6 to 27 oz., its usual range being between 7 and 11 oz. It is not pure water, but holds in solution considerable carbonic acid and an albuminous substance in a state of decomposition, which, on exposing the fluid to an elevated temperature, occasions a very evident putrid odor.

For the diseases of the lungs and other respiratory organs, see PNEUMONIA: PLEURISY: BRONCHITIS: CONSUMPTION: TUBERCLE: also INFLAMMATION: CONGESTION OF BLOOD: HÆMOPTYSIS: ETC.

RESPIRA'TION, ARTIFICIAL: a requisite in all cases of suspended animation, from drowning, noxious gases, chloroform, etc. It may be performed either by forcing air into the lungs by means of a pipe passed through the mouth or the nostril into the glottis, or (which is usually preferable) by imitating the natural expansion of the chest by muscular effort, as by the methods invented by Dr. Marshall Hall and by Dr. Sylvester.

The best mode of forcing air into the lungs is by the use of a small pair of bellows, with the nozzle inserted in one of the patient's nostrils. The air should be driven into the lungs with extreme gentleness, the larynx being pressed backward against the spine, so that the air may not go into the œsophagus and stomach. Gentle but firm pressure must be then applied to the chest to expel the introduced air, and fresh air again driven in; and this process of introducing and expelling the air alternately must be continued until either natural respiratory efforts appear, or the case becomes hopeless.

In the article ASPHYXIA, it is stated that one of the best methods of filling the lungs of an asphyxiated person with fresh air is that of Dr. Marshall Hall. Dr. Sylvester's method (*The True Physiological Method of Restoring Persons Apparently Drowned or Dead, and of Resuscitating Still-born Children*,—London 1859) is, however, generally regarded as decidedly preferable to that of Dr. Marshall Hall, though the same in principle. The following are Dr. Sylvester's rules, slightly modified by a committee whose investigations will be presently noticed. The patient is laid on his back on a plane, inclined a little from the feet upward; the shoulders are gently raised by a firm cushion being placed under them; the tongue is brought forward, so as to project a little from the side of the mouth. The operator then grasps the

patient's arms just above the elbows, and raises them till they nearly meet above the head. This action imitates inspiration. The patient's arms are then turned down, and firmly pressed for a moment against the sides of the chest. A deep expiration is thus imitated; and these two sets of movements should be perseveringly continued at the rate of about 15 times in a minute.

Fig. 1.

Special reference must be made to two important documents among the publications on this subject. The first is *Reports of the Scientific Committee on Suspended Animation*, presented to the Royal Medical and Chirurgical Society of London 1862, July; and when it is stated that this report was signed by 'C. J. B. Williams, *Chair-*

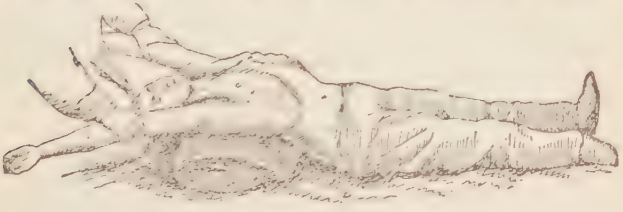


Fig. 2.

man, W. S. Kirkes, George Harley, J. B. Sanderson, C. E. Brown-Séquard, H. Hyde Salter, E. H. Sieveking, and W. S. Savory, *Honorary Secretary*,' its scientific claims to our attention are undeniable. The following are their suggestions in relation to treatment: 1. That all obstruction to the passage of air to and from the lungs be at once, so far as is practicable, removed; that the mouth and nostrils, e.g., be cleansed from all foreign matters or adhered mucus. 2. That in the absence of natural respiration, artificial respiration by Dr. Sylvester's method (above described) should be employed. 3. That if no natural respiratory efforts supervene, a dash of hot water (120° F.) or cold water be employed, for the purpose of exciting respiratory efforts. 4. That the temperature of the body be maintained by friction, warm blankets, the warm bath, etc. [Whether the warm bath is serviceable or positively hurtful is, however, still in question.] 5. That in the case of drowning, in addition

to the foregoing suggestions, the following plan may, in the first instance, be practiced: Place the body with the face downward, and hanging a little over the edge of a table, shutter, or board, raised at an angle about 30°, so that the head may be lower than the feet. Open the mouth, and draw the tongue forward. Keep the body in this posture for a few seconds, or a little longer if fluid escapes. The escape of fluid may be assisted by pressing once or twice upon the back.

The other document is *Instructions for the Restoration of the Apparently Dead from Drowning*, issued 1864 by 'The National Lifeboat Institution' of Great Britain. In these *Instructions* it is recommended that if breathing cannot be excited by application of stimulants to the nostrils, or by dashing water on the face, Marshall Hall's method should be tried; and that if this do not prove successful in from two to five minutes, Dr. Sylvester's method should be resorted to.

In conclusion, a reference must be made to *Reports of the Scientific Committee* [of the members of the Royal Medical and Chirurgical Society] *on the Uses and Effects of Chloroform*. The committee decide that the most certain means of restoring life after poisoning with anæsthetics is by artificial respiration. 'By this means, resuscitating may generally be accomplished after natural respiration has ceased, provided the heart continue to act; and it may *sometimes* be effected even after the cessation of the heart's action. Galvanism resuscitates within the same limits as artificial respiration; it is, however, far less to be relied on in equal cases. Galvanism may be used in addition to artificial respiration; but the latter is on no account to be delayed or suspended, in order that galvanism may be tried.'—*Proceedings of the Royal Medical and Chirurgical Society*, IV.

RESPIRATOR: name given by its inventor, Jeffreys, to an instrument which gives warmth to the air drawn into the lungs in breathing. It is attached to the mouth and is composed of several layers of very fine wire, fixed so near together that the exhaled air passing through them is diffused over a very large amount of surface, its warmth being absorbed by the metal, which, being an excellent conductor of heat, freely returns it to the cold air, drawn in through it in the act of inspiration. Mr. Jeffreys considers it necessary that about 20 layers of metal-work should be used, and, in order to make the instrument as light and compact as possible, each layer must be extremely thin. To 8 to 12 frames of sheet-silver, layers of fine wires are soldered about $\frac{1}{200}$ of an inch apart, and these wires are so numerous that a large respirator of high power contains 2,000 ft. of wire, divided into about 12,000 pieces, and soldered to the frames at more than 80,000 points. The air that is inhaled, meeting with layers of wire of gradually increasing heat, is raised to a high temperature. The whole wire-work is curved, so as to fit closely to the face, and is inclosed in a border or case of soft leather; and an

outer coat, usually of a very fine open woolen fabric, is added. The form of instrument chiefly used is fixed over the mouth, and is named *The Oral Respirator*. For an instrument to cover both mouth and nostrils, the term *Orinasal Respirator* is used. The use of these instruments is in allowing persons with delicate lungs to take out-of-door exercise with safety and advantage in comparatively severe weather.—Tyndall invented a *Smoke Respirator* for firemen: there are respirators for keeping out dust and metal-filings from the lungs of factory operatives: and respirators containing a sponge soaked with creosote or carbolic acid for excluding or destroying bacteria germs.

RESPIRATORY SOUNDS: sounds proceeding from the lungs or the bronchi. They are of the greatest importance in diagnosis of diseases of the lungs. They may be divided into (1) those directly resulting from inspiration and expiration; (2) those of the voice, including coughing.

In the healthy state of the lungs, two distinct sounds are heard, on applying the ear, either directly or through intervention of the stethoscope, to the walls of the chest —one called the *vesicular sound*, because it is supposed to be caused by the passage of the air from the ultimate tubes into the air-cells or vesicles; and the other the *bronchial sound*, because it is generated in the bronchial tubes by the air moving through them.

The vesicular sound, known also as the *respiratory murmur*, is produced mainly during inspiration; being very faint, and sometimes scarcely perceptible during expiration. It is rather a rustle than a murmur, and has been compared to the sighing of a gentle breeze among leaves, to the sound made in the deep inspiration of a sleeping person, etc.; but a single minute's application of the ear to the chest of a healthy person, below the collar-bone, will give clearer idea of its true nature than any mere description could convey. The sound is more distinct in thin than in fat persons, in women than in men, and in children than in adults. Indeed, it is so loud in children that when an unusually noisy sound is heard in an adult, it is said to be *puerile*.—The *bronchial sound* has a blowing character, such as may be produced by blowing air quickly through a tube, and is altogether distinct from the former: it may be most clearly heard over the trachea or windpipe, and at the upper part of the sternum or breast-bone.

Such are the R. S. in the healthy lungs. In disease, any change which tends to impair the respiratory function in one part of the lungs will make the vesicular murmur abnormally weak there, and abnormally loud in the remainder; and there are other changes, besides a mere increase or decrease of intensity, that sometimes occur, into which we have no space to enter.—The bronchial sound also is liable to morbid alteration; e.g., it may be heard in parts of the chest where it is usually inaudible, in consequence of condensation

of the surrounding pulmonary tissue, or from dilatation of the tubes, independently of condensation; and in violent dyspnœa, it may sometimes be heard over the whole chest without any change of structure. These morbid sounds are only modifications of those which occur in health.—There are, however, other sounds generated by disease which are highly important in diagnosis: these are termed *Râles* by the French, and *Rattles*, *Sibilus*, *Rhonchus*, etc., by those English writers who do not adopt the French term. They may be briefly divided into the *dry* and the *moist râles*, the former being caused by the passage of the air with increased rapidity through narrowed portions of the bronchial tubes; while the latter are formed by the passage of air through a fluid of more or less tenacity in the bronchial tubes, causing the formation of a succession of bubbles, whose bursting occasions the sound.

There are two other morbid sounds connected with the respiratory system which should be noted—viz., *metallic tinkling* and the *friction sound*. Metallic tinkling is a quick sharp sound, resembling that produced by striking a glass vessel with a pin: its occurrence affords evidence of the existence of a cavity of considerable size, containing air, and surrounded by firm walls; but how the sound is produced is not definitely settled. The friction sound is produced by the rubbing together of the pulmonary and costal pleuræ when rough from inflammatory action, and is indicative of pleurisy.

RESPIRE, v. *rĕ-spīr′* [F. *respirer*—from L. *respīrārĕ*, to respire—from *re*, back or again; *spīrō*, I breathe: It. *respirare*]: to breathe out; to draw air into the lungs and expel it again; to take breath, hence to rest. RESPIR′ING, imp. RESPIRED′, pp. *-spīrd′*. RESPIR′ABLE, a. *-ă-bl* [F.—L.]: fit for breathing or for the support of animal life. RESPIR′ABLENESS, n. *-bl-nĕs*, or RESPIR′ABIL′ITY, n. *-bĭl′ĭ-tĭ*, the state or quality of being respirable. RESPIRATION, n. *rĕs-pĭ-rā′shŭn* [F.—L.]: act of breathing (see above): relief from toil. RES′PIRATOR, n. *-rā-tėr*, an apparatus for covering the mouth, which serves to warm the air before being inhaled into the lungs. RESPIR′ATORY, a. *-tėr-ĭ*, pert. to or serving for respiration.

RESPITE, n. *rĕs′pĭt* [OF. *respit*, respite—from L. *respectus*, regard, consideration—from *re*, back or again; *speciō*, I look: F. *répit*; It. *rispitto*, respite]: delay, as for breathing; pause; interval; temporary suspension of the execution of the capital sentence on a criminal; a reprieve: V. to suspend; to delay for a time; to relieve by an interval of rest. RES′PITING, imp. RES′PITED, pp.—SYN. of 'respite, n.': a stop; interval; pause; delay; stay; cessation; reprieve.

RESPLENDENT, a. *rĕ-splĕn'dĕnt* [L. *resplendens* or *resplendentem*, shining brightly—from *re*, back or again; *splendĕō*, I shine]: very bright; having a beautiful lustre; shining with brilliancy. RESPLEN'DENTLY, ad. *-lĭ*. RESPLEN'DENCE, n. *-dĕns*, or RESPLEN'DENCY, n. *-dĕn-sĭ*, brilliant lustre; vivid brightness.

RESPLIT, v. *rē-splĭt'* [*re*, again, and *split*]: to split or rend a second time.

RESPOND, v. *rĕ-spŏnd'* [OF. *respondre*—from L. *respondĕrĕ*, to answer or reply—from *re*, back or again; *spondĕō*, I promise solemnly: It. *rispondere*: F. *répondre*]: to answer; to rejoin; to reply: N. in *Gothic arch.*, a half-pier attached to a wall and supporting an arch, etc.; in *sacred music*, a short anthem interjected in some service. RESPOND'ING, imp. RESPOND'ED, pp. RESPOND'ENT, a. *-ĕnt*, that answers to demand or expectation: N. one who replies: in *law*, one who answers; the party against whom another party presents a petition to a court which requires to be answered. RESPONDENTIA, n. *rĕ-spŏn-dĕn'shĭ-ă*, a contract by which a loan is effected by a bond on the security of the freight of a ship; money borrowed on the ship itself is termed *bottomry*. Such loans are resorted to by the master of a ship only in critical circumstances, to raise money for saving ship or cargo for benefit of all concerned.

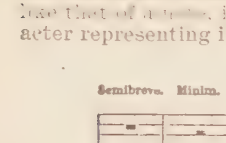
RESPONSE, n. *rē-spŏns'* [OF. *response*, a response—from L. *responsum*, an answer or reply—from *re*, back; *spondĕō*, I promise solemnly: It. *risposo*: F. *réponse*]: a reply or answer; an oracular answer; the answer of the people in certain parts of Divine service; rejoinder. RESPONSIBLE, a. *rĕ-spŏn'sĭ-bl*, answerable; accountable; amenable. RESPON'SIBLY, ad. *-blĭ*. RESPON'SIBLENESS, n. *-bl-nĕs*. RESPON'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*, state of being accountable or answerable. RESPON'SIVE, a. *-sĭv*, making answer; correspondent. RESPON'SIVELY, ad. *-lĭ*. RESPON'SIVENESS, n. *-nĕs*, the state of being responsive. RESPON'SIONS, n. plu. *-shŭnz*, the first examination which students at Oxford undergo before they can take any degree—familiarly called 'Smalls.' RESPON'SORY, a. *-sĕr-ĭ*, containing or making answer: N. [L. *responsorium*, a response] short sentence, generally a verse or portion of verse from Scripture, assigned in church services, to be uttered by the people responsively to the priest. Responsories are appended to lessons, to chapters, and to versicles, in common with which they are either chanted or simply repeated, according to the nature of the service. They are found in all ancient liturgies and in the Book of Common Prayer: in the latter the name is RESPONSE.

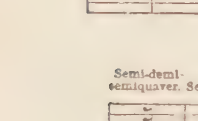
RESSAIDAR, n. *rĕs'ă-dâr'*, or RESSALDAR, *rĕs'ăl-dâr* [Hind.—from Ar. *reis*, a chief]: a native officer in a native cavalry regiment of India, in command of a squadron. RESSALAH, n. *rĕs'ă-lâ'*, a squadron of Indian native cavalry.

REST, n. *rĕst* [AS. *rest* or *ræst*, repose: **Dan. and Sw.** *rast*; Ger. *rast*; OHG. *rasta*; Dut. *rust*, ease, quiet]: a state free from motion or disturbance; quiet; repose; sleep; final sleep; death; cessation from mental or physical labor; place of repose; the grave; that on which a thing leans for support; trust; peace: in *music*, a pause in sound, or the mark to indicate it (see below): in *her.*, a charge, called sometimes organ-rest: V. to lay or place at rest; to cease from action or motion of any kind; to be tranquil; to be at peace; to recline; to be in a state of repose or slumber; to sleep the final sleep; to lean on; to trust or rely. REST'ING, imp. REST'ED, pp. REST'FUL, a. in *OE.*, quiet; being at rest. REST'LESS, a. *-lĕs*, not still; unquiet; disturbed; sleepless; unsettled; roving. REST'LESSLY, ad. *-lī*. REST'LESSNESS, n. *-nĕs*, the quality or state of being restless; uneasiness; want of sleep. REST-HOUSE, in *East Indies*, an empty house for the accommodation of travellers. REST-HARROW, a common leguminous weed with strong fibrous roots; *Onŏnis arven'sis*. RESTING-PLACE, a place to rest at. TO REST WITH, to be in the power of; to depend upon.—SYN. of 'rest, n.': sleep; repose; peacefulness; stillness; cessation; quiet; tranquillity; peace; support; interval; pause; intermission; stop; stay; slumber; ease; quietness;—of 'rest, v.': to sleep; slumber; die; cease; be still; acquiesce; lean; recline;—of 'restless': unquiet; disquieted; unsettled; roving; wandering; uneasy; disturbed; sleepless; agitated; anxious.

REST, n. *rĕst* [F. *rester*, to remain; *reste*, a remainder —from L. *restārĕ*, to remain—from *re*, back; *stārĕ*, to stand: It. *restare*, to leave an overplus]: that which remains, or may remain, after the separation of a part; remnant; remainder; overplus; residue; others; a surplus fund held in reserve by a bank or a public company in order to equalize the dividends, should the profits made in any one year fall below the amount required for paying the usual dividend to the shareholders: V. in *OE.*, to be left; to remain. RESTING OWING [F. *en reste*, in arrear]: in *Scots law*, remaining due; indebted.

REST, in Music: interval of silence in the course of a movement between one sound and another; its duration, like that of a note, is indicated by the form of the character representing it.





For rests of still longer duration, it is now usual to draw one or two oblique lines across the staff, and write on them in figures the number of measures during which the voice or instrument is to be silent.

Thus,

. in common time, denotes a rest of 13 semibreves. A rest, like a note, may be prolonged by one or more dots.

RESTANT, a. *rĕs'tănt* [L. *restans* or *restant'em*, remaining—from *restārē*, to remain: F. *restant*]: in *bot.*, remaining, as foot-stalks after the fructification has fallen off.

RESTATE, v. *rē-stāt'* [*re*, again, and *state*]: to state anew.

RESTAURANT, n. *rĕs'tō-rânq* [F. *restaurant*—from *restaurer*, to restore, to re-establish—from L. *restaurārē*, to restore]: an eating-house; a place for the sale of refreshments. RESTAURATEUR, n. *rĕs-tō'rā-tĕr'*, an eating-house keeper; one who keeps a place for the sale of refreshments.

RESTEM, v. *rē-stĕm'* [*re*, back, and *stem*]: to force back against the current.

REST'-HARROW (*Ononis*): genus of plants of nat. order *Legaminosæ*, sub-order *Papilionaceæ*; having a 5-cleft bell-shaped calyx, the standard of the corolla large and striated, the keel beaked, the pod turgid and few-seeded. There are many species, natives chiefly of Europe, and generally herbaceous or half-shrubby.—The Common R.-H. (*O. arvensis*) is abundant in pastures and by waysides in Britain. Its lower leaves have three leaflets the upper are simple; the flowers are axilary and rose-colored, or occasionally white. The plant is half-shrubby, with somewhat spiny stems; viscid; and its smell strong and unpleasant. The roots are tough and woody, whence its name. It is sometimes a troublesome weed, but only in neglected pastures, and disappears before careful cultivation.

RESTIACEÆ, *rĕs-tĭ-ā'sē-ē :* natural order of endogenous plants, nearly allied to *Cyperaceæ*, natives mostly of the s. hemisphere, and abounding at the Cape of Good Hope and in Australia. They are herbaceous, or sometimes half-shrubby; have simple stems and narrow leaves; and are hard, wiry, and rush-like. They have generally a creeping root-stock. The flowers are in heads or spikes, generally unisexual, with 2–6 glumes, sometimes with none; two or three stamens, an ovary with 1–3 cells, one ovule in each cell, the fruit a capsule or nut. *Restio tectorum* is much used for thatching houses at the Cape of Good Hope. *Wildenowia teres* is used for making baskets and brooms.

RESTIFF, a. *rĕs'tĭf* [OF. *restif ;* F. *rétif*, restive]: an OE. spelling of RESTIVE. RES'TIFFNESS, n. *-nĕs*, for RESTIVENESS. See RESTIVE.

RESTIFORM, a. *rĕs'tĭ-fawrm* [L. *restis*, a cord; *forma*, shape]: like a cord; rope-shaped.

RESTIGOUCHE, *rĕs-tĭ-gōsh' :* one of the n. counties of New Brunswick, adjoining the Bay of Chaleurs and Quebec; area nearly 3,000 sq. m. The R. river passes through it and forms a portion of the boundary between New Brunswick and Quebec. The river is about 200 m. in length and for about 24 m. from its mouth is a tidal estuary, navigable for the largest ships 18 m. The main river, formed of five head streams, flows through a mountainous region with many fertile valleys. The fishing interest is of considerable importance, and attracts sportsmen from a distance. Large quantities of lumber are exported.

RESTIPULATE, v. *rē-stĭp'ū-lāt* [*re*, again, and *stipulate*]: to stipulate anew. RE'STIPULA'TION, n. a new or second stipulation.

RESTITUTION, n. *rĕs'tĭ-tū'shŭn* [F. *restitution ;* Sp. *restitucion*, restitution—from L. *restitūtiō*, a restoration—from *re*, back; *statūō*, I put or place; *sto*, I stand]: act of making good any loss, damage, or injury; the restoration of something lost or taken away; amends; reparation: in *Scotch law*, obligation of the purchaser of a movable, which really belongs to a third party, to deliver it up to such real owner without claiming repayment of price (see REPETITION).—SYN.: restoration; reparation; indemnification; return; compensation; amends.

RESTIVE, a. *rĕs'tĭv* [OF. *restif*, restive, stubborn: F. *rétif*—from L. *restārĕ*, to stand still, to withstand: It. *restio*]: restless and unwilling to stir, or only moving backward, as a horse; obstinate in refusing to move forward; impatient under restraint or opposition; stubborn; recalcitrant; uneasy; in *OE.*, being at rest; being less in motion. RES'TIVELY, ad. *-lĭ*. RES'TIVENESS, n. *-nĕs*, obstinacy or unwillingness to move forward; obstinate unwillingness or impatience. RESTY, a. *rĕs'tĭ*, restive; in *OE.* spelled RESTIFF.

RESTORATION, THE, in English History: resumption of monarchical govt., on the accession of Charles II., 1660, May 29, after an interval of 11 years, from 1649, Jan. 30, when Charles I. was beheaded, during which the govt. of Great Britain was republican. The R. was appointed by various statutes to be observed as a festival in the Church of England, with special religious services; but its observance was abolished 1859.

RESTORATIONIST: believer in only a temporary future punishment—an old doctrine under a new name. It has found advocates at all times since the days of Origen (q.v.). One of the most remarkable doctrines of that Father was his belief of a general *apokatastasis*, or 'restoration' of all things, in which, after a purgation proportioned to the various moral conditions of their souls at the time of death, all men, however wicked, and all the evil angels, even Lucifer himself, would be restored to holiness and to the favor of God, and reunited to Him in heaven. This doctrine was condemned at the time, and has since been repeatedly rejected by the churches of the East as well as of the West. Restorationism has been renewed in more than one form since the Reformation by various classes, who have taken the name Universalists (q.v.). The particular title of Restorationists was given in America to the followers of Hosea Ballou (q.v.), who, in addition to the tenet above explained, preached that all retribution is confined to this life; and who, though he denied the immortality of the soul, yet taught that at the resurrection all men will be admitted to everlasting happiness.

RESTORE, v. *rē-stōr'* [F. *restaurer*, to restore—from L. *restaurāre*, to make to stand again, to restore; It. *restaurare*]: to replace; to give or bring back that which has been lost or unjustly taken away; to bring back to its former state; to rebuild; to renew: N. in *OE.*, restoration. RESTOR'ING, imp. RESTORED, pp. *rē-stōrd'*. RESTOR'ABLE, a. *-ā-bl*, capable of being brought to a former condition. RESTOR'ABLENESS, n. *-nēs*, the quality or state of being restorable. RESTORATION, n. *rēs'tō rā'shŭn*, the act of restoring or replacing; renewal; recovery; restitution; reparation (see RESTORATION, THE). RES'TORA'TIONIST, n. *-shŭn-ĭst* (see above). RESTORATIVE, a. *rē-stōr'ā tĭv*, having power to restore or renew, as health and vigor: N. a medicine efficacious in recruiting the vital powers. RESTOR'ATIVELY, ad. *-lĭ*. RESTOR'ER, n. *-ĕr*, one who restores.—SYN. of 'restore': to recover; replace; renew; renovate; reinstate; re-establish; return; revive; recover; refund; repay; repair; heal; cure.

RESTRAIN, v. *rē-strān'* [O.F. *restraindre*; F. *restreindre*, to restrict—from L. *restringĕrĕ*, to check, to restrain—from *re*, back; *stringo*, I draw tight: It. *restringere*]: to hold back; to bind fast; to curb; to repress; to limit; to abridge. RESTRAIN'ING, imp. RESTRAINED, pp. *rē-strānd'*. RESTRAIN'ER, n. *-ĕr*, one who restrains. RESTRAIN'ABLE, a. *-ā-bl*, capable of being restrained. RESTRAIN'MENT, n. *-mĕnt*, the act of restraining. RESTRAIN'EDLY, ad. *-ĕd-lĭ*. RESTRAINT', n. *-strānt'*, the act of restraining; abridgment of liberty; restriction; hindrance of will; repression; that which restrains.—SYN. of 'restrain': to withhold; keep in; repress; suppress; hinder; abridge; hold in; limit; confine; check; stop; curb; coerce; restrict;—of 'restraint': abridgment; prohibition; limitation; restriction; repression; hindrance; check; stop; curb; coercion; confinement.

RESTRENGTHEN, v. *rē-strĕngth'n* [*re*, again, and *strengthen*]: to strengthen anew.

RESTRICT, v. *rē-strĭkt'* [L. *restrictus*, confined, restricted—from *re*, back; *stringĕrĕ*, to draw tight (see RESTRAIN)]: to keep back within certain limits; to circumscribe; to limit. RESTRICT'ING, imp. RESTRICT'ED, pp. limited; confined to bounds. RESTRICTION, n. *rē-strĭk'shŭn* [F.—L.]: limitation; restraint; that which restricts. RESTRICT'IVE, a. *-ĭv*, having the quality of limiting, or expressing limitation; imposing restraint. RESTRICT'IVELY, ad. *-lĭ*.—SYN. of 'restrict': to restrain; curb; confine; coerce, limit; bound; circumscribe; repress.

RESTY: see under RESTIVE.

RESUBJECT, v. *rē'sŭb-jĕkt'* [*re*, again, and *subject*]: to subject a second time. RE'SUBJEC'TION, n. a second subjection.

RESUBLIME, v. *rē'sŭb-līm'* [*re*, again, and *sublime*]: to sublime again. RESUB'LIMA'TION, n. a second sublimation.

RESULT, v. *rē-zŭlt'* [F. *résulter*, to result—from L. *resultārĕ*, to spring back—from *re*, back; *salĭō*, I leap: It. *resultare*]: to follow or have origin, as a consequence, from facts, arguments, thought, etc.; to spring; to arise; to originate; to issue; to ensue: N. that which proceeds from a given state of facts, etc.; consequence; inference; decision; issue. RESULT'ING, imp. RESULT'ED, pp. RESULT'ANT, n. *-ănt*, in *dyn.*, a force which results from the composition or putting together of two or more forces acting on the same point: ADJ. that arises from combination. RESULT'LESS, a. *-lĕs*, without result.—SYN. of 'result, n.': consequence; effect; issue; event; conclusion; inference;—of 'result, v.': to spring; proceed; arise; ensue; terminate.

RÉSUMÉ, n. *rā-zō'mā* [F. *résumé*, a summary; *résumer*, to sum up (see RESUME)]: a summing up; a condensed statement; a summary; a recapitulation.

RESUME, v. *rē-zūm'* [L. *resumĕrĕ*, to take back, t. re- + *sumĕre*—from *re*, again; *sumo*, I take: Sp. *resumir*; F. *résumer*]: to take back that which has been given or taken away: to proceed or take up again after interruption; to begin again: to take again. RESU'MING, imp. RESUMED', pp. *-zūmd'*. RESUMABLE, a. *-a-bl*, that may be taken back or up again. RESUMP'TION, n. *-zūmp'shŭn* [L. *resumptus*, resumed]: the act of taking back or taking again. RESUMP'TIVE, a. *-tĭv*, taking back or again.

RESUMMON, v. *rē-sŭm'mŏn* [*re*, again, and *summon*]: to summon or call again.

RESUMPTION: see under RESUME.

RESUPINATE, a. *rē-sū'pi-nāt* [L. *resupīnātus*, bent or turned back—from *re*, back or again; *sapino*, I bend backward; *supīnus*, lying on the back]: in *bot.*, so turned or twisted that the parts naturally the undermost become the uppermost, and *vice versa*. RESUPINE, a. *rē-sū'-pīn'*, lying on the back.

RESUPPLY, v. *rē-sŭp-plī'* [*re*, again, and *supply*]: to supply again.

RESURGENT, a. *rē-sĕr'jĕnt* [L. *resur'gens* or *resurgen'tem*, rising or appearing again—from *re*, again, *surgĕrĕ*, to rise]: rising again, as from the dead, swelling up.

RESURRECTION, n. *rĕz'ĕr-rĕk'shŭn* [F. *résurrection*—from L. *resurrectiōnem*, resurrection—from *resurrectus*, risen again—from *re*, again; *surgĕrĕ*, to rise: It. *resurrezione*]: a rising again from the dead; the rising of the dead from the grave at the general judgment (see RESURRECTION, THE): a moral revival, as from a state of ignorance or degradation. RES'URREC'TIONIST, n. *-ĭst*, a despoiler of graves for purposes of dissection.

RESURRECTION, THE: the rising from the dead of the human body in the future life. We find dim hints of this doctrine in different religions, especially in later Judaism, but the doctrine is peculiarly Christian. In the earlier Hebrew Scriptures, the Pentateuch, the Psalms, the earlier prophecies, there is no distinct reference to it. It is supposed to be alluded to in Is. xxvi. 19, and in Ezek. xxxvii., in the well-known chapter as to the revival of dry bones in the valley of vision; and in Daniel xii. 2, there is the distinct affirmation that 'many that sleep in the dust of the earth shall awake, some to everlasting life, and some to shame and everlasting contempt.' There is also a well-known passage in Job (xix. 25–27) which has been usually considered to refer to the R. of the body. A large school of recent criticism denies the validity of this reference; but this denial has called forth stronger argument in defense of the reference. In the later Judaism the tenet of the R. appears, and in the time of Christ it had become a formal doctrine of the Pharisees. The general body of the Jewish people also seem to have believed it. The Sadducees alone disputed it (Matt. xxii. 23, sq.; Luke xx. 27, sq.; Acts xxiii. 6–8). It appears, in fact, to have become bound

up in the Jewish mind with the idea of a future life, so that an argument which proved the one proved the other; and the Sadducees not merely denied the distinctive idea of the R., but further denied the existence of any 'angel or spirit.'

It remained for Christ and his apostles to reveal clearly the R. of *man*—soul and body—and to connect it with the fact of Christ's own R. as its special evidence and pledge. The following may be stated as the main points involved in the doctrine as it appears in the New Test.: 1. The R. is ascribed to Christ himself; it will complete his work of redemption for the human race (John v. 21; 1 Cor. xv. 22, sq., I Thess. iv. 14; Rev. i. 18). 2. All the dead will be raised indiscriminately to receive judgment according to their works, 'they that have done good, unto the resurrection of life; and they that have done evil, unto the resurrection of condemnation' (John v. 21–29; I Cor. xv. 22; Rev. xx. 11). 3. The R. will be at 'the last day,' by which seems to be meant the close of the present world (John vi. 39, 40; xi. 24; I Thess. iv. 15). 4. The great event is represented as ushered in by the sound of a trumpet—i.e., by a mighty *call* heard by the whole race of man—a representation used probably in view of the Jewish practice of convening great assemblies by sound of trumpet (I Cor. xv. 52; I Thess. iv. 16). 5. As to the character of the change through which men's bodies are raised after the lapse of ages, with their identity preserved, nothing is distinctly made known; the fact is abundantly and most positively declared, but the mode—like other points of curious philosophical inquiry concerning revealed facts—is not in any way even remotely indicated. The impossibility of such a change was evidently a subject of argument in the primitive Christian age, and the apostle Paul argues in its favor with majestic force (I Cor. xv. 32, sq.) from common occurrences scarcely less mysterious in the natural world. It is not professed, however, that such occurrences explain the R.: the apostle designs rather to silence cavils, and to invigorate faith by freeing the doctrine from prejudices which ignorance tended to attach to it. Arguing from God's infinite power as displayed in the processes of creation, he would, as it were, press the question which he asks elsewhere: 'Why should it be thought a thing incredible with you that God should raise the dead?' (Acts xxvi. 8), rather than attempt any explanation, of which the subject does not really admit in the present limited capacity of the human mind. And this is the spirit in which this sublime fact of the R. of man—body and soul—is to be contemplated. Its *mode*—involving the *nature of matter*, which is not yet ascertained by any science, but only conjectured in opposing theories, involving also the still unknown relations of matter and spirit—necessarily transcends our present intelligence.

RESURVEY, v. *rē'sėr-vā'* [*re*, again, and *survey*]: to survey a second time.

RESUSCITATE, v. *rē-sŭs'sĭ-tāt* [L. *resuscitātus*, roused again, revived—from *re*, again; *suscĭtārĕ*, to raise—from *sub*, under; *citārĕ*, to rouse: It. *risuscitare*: F. *ressusciter*]: to recover from apparent death; to revivify; to revive; to come to life again. RESUS'CITATING, imp. RESUS'CITATED, pp. RESUS'CITATOR, n. *-tėr*, one who resuscitates. RESUS'CITABLE, a. *-tă-bl*, that may be recovered from apparent death. RESUS'CITA'TION, n. *-tā'shŭn*, the act of reviving from a state of apparent death. RESUS'CITATIVE, a. *-tā-tĭv*, revivifying.

RET, v. *rĕt* [Ger. *rösten*, to steep: Dut. *rotten*, to rot, to putrefy: a modification of *rot*, Sw. *rota*, to rot or putrefy]: to destroy by rotting. To RET FLAX, to steep it in water in order to separate the fibre by incipient rotting. RET'TING, imp. RET'TED, pp. RET'TERY, n. *-tėr-ĭ*, a place or factory for preparing flax.

RETAIL, v. *rē-tāl'* [F. *retaill*, a shred or small piece cut from a thing—from *re*, again; *tailler*, to cut; *taille*, a slitting—from L. *tālĕa*, a thin rod, a cutting]: to sell in small quantities; to sell at second-hand; to relate in broken parts, as a story: N. *rē'tāl*, the sale of goods in small quantities; opposite of *wholesale*. RETAIL'ING, imp. RETAILED', pp. *-tāld'*. RETAIL'ER, n. *-ėr*, one who retails; one who sells in small quantities; RETAIL'MENT, n. *-mĕnt*, the act of retailing.

RETAIN, v. *rĕ-tān'* [F. *retenir*—from L. *retinērĕ*, to keep back, to restrain—from *re*, back; *tenō*, I hold: It *ritenere*]: to hold or keep in possession; to keep; to keep back; to hold from escape; not to lose or lay aside; to keep in pay; to engage by a fee paid. RETAIN'ING, imp. RETAINED', pp. *-tānd'*. RETAIN'ER, n. *-ėr*, an attendant; a servant: a hanger-on: in *law* (see below). RETAIN'ABLE, a. *-ă-bl*, capable of being retained.—SYN. of 'retain': to hold; restrain; keep; detain; preserve; hire; withhold; continue.

RETAIN'ER, in Law: act of engaging an attorney or counsel to attend to a certain suit or case. The R. is generally a precautionary measure resorted to only in the case of eminent counsel, the effect being to prevent the other party from securing the services of such counsel; and this is considered a prudent precaution in most cases of importance. The retaining fee, often large, is also sometimes called a retainer.

RETAINING WALL: wall built to retain earth, sand, or other incoherent substances in positions and forms which otherwise they could not maintain. These substances, if left to themselves, will not stand with vertical sides, but will fall down till they assume a certain slope. The angle which this slope makes with the horizontal is called the 'angle of repose.' This angle varies according to the nature of the material; e.g., that of moist soil is about 45°, while fine sand assumes an angle of about 30°.

In fig. 1, E represents a section of a mass of earth,

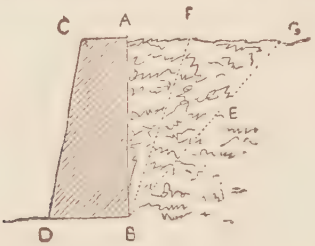


Fig. 1.

which it is desired to retain by means of the wall ABCD. If we draw BG from B at the angle of repose, it is evident, from what has been said, that the prism ABG is kept in position by the retaining wall; and if the earth began to give way, it would do so by slipping on some line BF. The wedge-shaped piece ABF, which has the greatest tendency to separate itself from the rest of the mass, is called the 'prism of greatest pressure;' and the retaining wall ABCD must be made of sufficient weight and thickness to prop it up and resist its tendency to slide. The line BF is found to bisect the angle ABG. In estimating the requisite thickness of the wall, it must be taken into account that the wall may give way in various manners; it may be overturned, or it may slide as a whole along its base DB, or the upper parts may give way, while the base remains. From these data, mathematical formulæ have been worked out, which determine the thickness requisite for different situations and materials, such as that given by Poncelet for ordinary materials and within ordinary limits:

$$x = \cdot 285(\mathrm{H} + h).$$

Where H, the height of the wall, and h, the additional height of the bank above the top of the wall, being given, x, the thickness of the wall, can be found.

These formulæ, however, are of little practical value, on account of the varying nature of the data on which they are founded, and of the excess of strength requisite in all such constructions, to allow for causes of failure, which cannot be foreseen or provided for in the calcu-

lations. Practical experience is found to be the only safe guide in all such considerations.

Figs. 2, 3, and 4 represent sections of forms of retaining walls in common use. Figs. 2 and 3 are used in retaining earthworks, while fig. 4 is a common form of dock-wall.

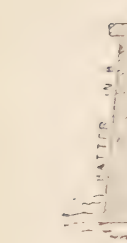


Fig. 2.

In that shown by fig. 2, the thickness at the top is 2 to 3 ft.; the back is vertical, and the front is sloped out 1 ft. for every 8 ft. in height; so that the thickness increases with the height, in the same manner as the pressure of the earth, which it is required to resist. The foundation is of large stones, extending beyond the sides of the wall, so as to distribute the pressure on as large a surface as possible. It is also sunk 2 or 3 ft. below the adjoining surface, to resist its tendency to slip on its base. At its back are placed counterforts, C, which are built up with the wall, and are about 3 ft. long by 2½ ft. wide, 8 to 10 ft. apart. These counterforts stiffen the wall like ribs; they put its centre of gravity further back, and so resist the tendency to heeling or overturning; they also act advantageously in dividing the earth, and so diminishing the length of the mass, which can act together against the wall. This form is very simple in construction.

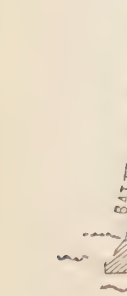


Fig. 3.

The form of wall in fig. 3 is that which requires least material; it also, on account of its thinness, dries and consolidates rapidly, but is not so easily built as that shown in fig. 2.

The dock-wall in fig. 4 is made much heavier than the simple pressure of the earth behind it would require; for it has many strains to bear of exceptional character due to its situation; such are the machinery and goods deposited on the quays, and the possible accident of the dock being suddenly emptied of water, while the earth behind the wall is full of water.

In the construction of a retaining wall, a great desideratum is, that the earth behind it be well drained; for if water be allowed to accumulate behind the wall, the earth becomes semi-fluid, in which state it gives a very much increased pressure. For this purpose, holes are left through the wall called 'weeping-holes;' these holes are about 9 inches high and 2 inches wide, and are generally placed about 1 for every 36 sq. ft. of wall. Also

stones without mortar are frequently built up behind the wall, so forming an open stratum, into which the

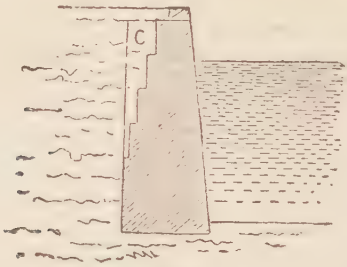


Fig. 4.

water drains, and is thence carried off through the weeping-holes.

RETAKE, v. *rē-tāk′* [*re*, again, and *take*]: to take again; to recapture.

RETALIATE, v. *rē-tăl′i-āt* [mid. L. *retaliātus*, retaliated—from L. *re*, back; *tālio*, retaliation—from *tālis*, such, like: F. *talion*, a pain or requital equal to the harm done, tit for tat]: to return by giving like for like, in an ill sense; to requite or pay back with the like. RETAL′IATING, imp. RETAL′IATED, pp. RETAL′IA′TION, n. *-ā′shŭn*, the return of like for like; retribution. RETAL′IATIVE, a. *-ā-tĭv*, or RETAL′IATORY, a. *-ă-tēr-i*, returning like for like.—SYN. of 'retaliation': reprisal; retribution; requital; repayment; punishment; revenge.

RETARD, v. *rē-tärd′* [F. *retarder*, to delay: *retard*, delay—from L. *retardārĕ*, to impede, to retard—from *re*, back or again; *tardārĕ*, to make slow—from *tardus*, slow: It. *ritardare*]: to impede; to hinder; to render slower: N. in *OE.*, retardation; delay. RETARD′ING, imp. RETARD′ED, pp. RETARD′ER, n. *-ėr*, he or that which retards. RETARD′MENT, n. *-mĕnt*, or RETARDATION, n. *rē′tär-dā′shŭn* [F.—L.]: the act of lessening the velocity of motion; hindrance. RETARD OF THE TIDE, the interval between the transit of the moon at which a tide originates and the appearance of the tide itself. RETARDATION OF MEAN SOLAR TIME, the change of the mean sun's right ascension in a sidereal day, by which he appears to hang back, as it were, in his diurnal revolution.—SYN. of 'retard, v.': to hinder; obstruct; procrastinate: defer; impede; detain; delay.

RETCH, v. *rēch* [AS. *hræcan*; Icel. *hrækja*, to retch: Norw. *rækja*, to hawk, to spit: Dut. *rachelen*, to cough: It. *recere*, to vomit: Gael. *ruchd*, to grunt, to belch]: to make an effort to vomit; to strain; to heave at the stomach. RETCH′ING, imp. RETCHED, pp. *rēcht*.

RETE, n. *rē'tē* [L., *rēte*, a net, a snare]: a net; network. RETECIOUS, a. *rē-tē'shŭs*, resembling network. RETICLE, n. *rĕt'ĭ-kl*, a small net. RETE MIRABILE, *mĭr-ăb'ĭ-lē* [L., a wonderful net]: in *anat.*, a complicated anastomosis of blood-vessels. RETE MUCOSUM, *mū-kō'zŭm* [L., a mucous net]: in *anat.*, the soft underlayer of the epidermis or scarfskin, which gives the color to the skin.

RETELL, v. *rē-tĕl'* [*re*, again, and *tell*]: to tell again.

RETENE, n. *rĕt'ēn*: a resinous body of the anthracene series, polymeric with benzine.

RETENTION, n. *rē-tĕn'shŭn* [F. *rétention*—from L. *retentiōnem*, a holding back—from *re*, back; *tenĕō*, I hold: It. *ritenzione*]: act or power of retaining, as in the memory; the memory: undue withholding of some natural discharge; restraint; reserve. RETENTIS, n. *rē-tĕnt'ĭs*, things retained. RETEN'TIVE, a. *-tĭv*, having power to retain, as in the memory. RETEN'TIVELY, ad. *-lĭ*. RETEN'TIVENESS, n. *-nĕs*, the quality of being retentive. TO BE KEPT IN RETENTIS, to be kept among things retained or reserved for some future purpose.

RETENTION OF URINE: lack of power to discharge the urine from the bladder: it must be distinguished from a far more serious affection known as *suppression of urine*, in which also no urine is passed because in this case there is none in the bladder. R. may arise either from change of structure of the parts concerned in the expulsion of the urine, or from mere disordered function unaccompanied by change: the former causes are termed *organic*, the latter *functional*.

Among chief organic causes are: 1. Permanent stricture of the Urethra (q. v.). 2. Contraction of the Urethra, in consequence of a blow on the perinæum, or other external injury. 3. Tumors within the urethra. 4. Foreign bodies in the urethra, as calculi, clots of blood, or mucus, etc., which have entered it from the bladder, or fragments of bougies, etc., introduced from without. 5. Enlargement of the prostate gland, especially in aged men. The treatment in R. from these causes must be left in the hands of the surgeon.

The principal functional causes are: 1. Spasm of the urethra, often termed spasmodic stricture. 2. Lack of power in the muscular coat of the bladder and urethra. Spasm of the urethra is most likely to occur in those who have a slight permanent stricture, or a urethra irritable from other causes. The spasm usually follows exposure to cold and wet, but it may be excited by piles or other sources of irritation in the lower bowel, or by the use of cantharides either taken internally as a medicine, or absorbed from blisters applied to the skin. The patient finds himself unable to pass his water, though he has a great desire and makes strong efforts to do so. The bladder soon becomes so distended that it can be felt as a tense round tumor above the pubes. If relief be not speedily afforded, the bladder may burst,

and discharge its contents into the peritoneal cavity, in which case death rapidly ensues; or the urethra behind the stricture gives way, and the urine is extravasated into the cellular tissue of the adjacent parts—a condition which, if not promptly relieved by surgical interference, is likely to be followed by gangrene, typhoid symptoms, and death. If the symptoms are not very severe, and there is no evidence of old permanent stricture, a hot bath, combined with administration of the tincture of muriate of iron, in doses of ten minims, taken every ten minutes in thin gruel or in barley-water, will often give relief. Sometimes a full opiate administered by the mouth, or preferably as an enema, or the inhalation of a few whiffs of chloroform, will, by allaying the spasmodic action, give immediate relief. If these means fail, surgical assistance must be at once procured, and the bladder evacuated by a catheter—an operation often requiring very delicate manipulation. If these means fail, which happens only when the spasm is associated with old-standing disease of the urethra, the surgeon must either puncture the bladder through the rectum, or above the pubes, or make an incision into the urethra either at or behind the seat of the stricture.

Paralysis of the muscular coat of the bladder may arise from the debility of old age, from the depressed state of the nervous system in fevers of the typhoid type, from injury or disease of the head or spine, and from various other causes. In temporary form, it is often a result of overdistention of the bladder from stricture or prostatic disease, and it sometimes occurs in the case of nervous sedentary persons, if they have allowed rather more than the usual time to elapse without evacuating the bladder. It should be generally known that R. from paralysis is sometimes accompanied with dribbling away of the water, so that the retention might at first sight be mistaken for *incontinence* of urine. On examination, however, it will be found that the bladder is abnormally distended, and cannot be evacuated by the act and will of the patient. In these cases, the urine must for a time be regularly drawn away by the catheter. General tonics, such as the cold bath (sometimes preferably the sitz-bath) and chalybeates, must be given to improve the general health; while medicines supposed to act locally on the mucous coat of the bladder, or on the spinal cord, must be simultaneously administered.—A peculiar form of retention sometimes occurs in women of hysterical temperament, in which the will rather than the power is at fault: the treatment should be directed toward the general hysterical tendency, rather than to this special manifestation of it.

RETEPORA, n. plu. *rē-tē-pō-rā* [L. *rēte*, a net; *pōrus*, a pore]: genus of Bryozoa which have their cell-pores arranged in net-like order. RETEPORE, n. *rē'tē-pōr*, one of the Retepora.

Retepora cellulosa.

RETFORD, *rĕt'fĕrd*, EAST: small municipal borough and market-town, county of Notts, England, on the right bank of the Idle, affluent of the Trent, 138 m. n.n.w. of London by the Great Northern railway. West R., on the other side of the river, and connected with East R. by a strong bridge of five arches, is a more modern and much smaller town.—Tanning, coach-making, and paper-making are carried on, and there are several iron-foundries. Pop. of municipal borough (1881) 9,748; (1891) 10,603.